Sectional Meetings

Details of technical meetings follow. See map for building locations. Business meetings are scheduled for each section. An important item of business is the election of officers.

A. ZOOLOGY

MORNING SESSION

ENGINEERING-SCIENCE 1047
ANDREW M. WHITE, PRESIDING

INTEGRATED PEST MANAGEMENT PROGRAMS IN OHIO. B. D. Blair. Ohio State University, 1735 Neil Avenue, Columbus, Ohio 43210.

9:30

Integrated Pest Management (IPM) in Ohio began with a pilot project in no-till corn in one county in 1973. Organized IPM programs are currently in 27 Ohio counties involving corn, soybeans, and alfalfa. Vegetable crop programs are in the development stages involving tomatoes in four counties, sweet corn in four counties, peppers, squash, cucumbers, cabbage and eggplant included in one county.

IPM scouts are trained during a two-week short course at Ohio State University and training continues throughout the summer at the rate of ½-day/week in the field. Scouts visit fields at weekly intervals, check for disease, insects, weeds and other pests and leaves a report with the producer. When problems exceed economic thresholds, growers receive control recommendations from county agricultural agents. The majority of scouts are college students. Projections for 1980 indicate that 100 scouts will be needed.

IPM information collection includes the use of heat units, day degrees, a 3-state light trap network, and reports from extension personnel to predict insect events. IPM information dissemination includes the use of dial-a-message phones, newsletters (by mail and computer) and publications.

COMPARISON OF BEETLE COMPONENTS OF TEMPERATE AND TROPICAL COW DUNG COMMUNITIES, Gary Bernon, Department of Biological Sciences, Bowling Green State University, Bowling Green, Ohio 43403.

9:45

An African cow dung community was found to be comparable to North American dung communities with reference to Coleoptera families present. Four dominant families were found in both tropical and temperate communities: Scarabaeidae, Histeridae, Hydrophylidae, and Staphylinidae. Species richness in the African community was approximately ten times greater for Scarabaeidae (104 species) and Histeridae (15 species), but roughly comparable for Hydrophylidae (5 species) and Staphylinidae (20 species). Resource partitioning and the lack of food as a limiting resource were partly responsible for the coexistence of species rich guilds. Competition for brood space appears to be the dominant factor influencing community structure among the coprophagous beetles in the African dung community.

LEAFHOPPER POPULATIONS ON ALFALFA. Bruce W. Triplehorn, Department of Entomology, Ohio State University, Columbus, Ohio

10:00

Over the years, many studies have been done on the populations of the potato leafhopper, Empoasca fabae, and the effects of the leafhopper on alfalfa. This study was designed to look at the populations of various species of leafhoppers on different varieties of alfalfa through the growing season. Ten varieties were used from the Ohio State Farm Science Review as test plots. The plots were sprayed twice with a malathion-methoxychlor mixture as recomended. The method of sampling was by using a sticky board trap.

The results showed that the most abundant leafhopper was not Empoasca fabae as had been previously reported from unsprayed plots, but the most abundant leafhopper found was the black-faced leafhopper, Graminella nigrifrons. Upon examining the seasonal numbers of the two species, it was found that the black-faced leafhopper does not increase in number until after the first spraying. Before spraying, the potato leafhopper is the most abundant. There is probably a secondary pesticide effect. Nitrogen analysis of the alfalfa plots indicates a greater correlation between Graminella nigrifrons populations than was found between nitrogen loss and Empoasca fabae populations.

TRANSPORT OF EXCESS DIETARY WATER IN THE COMMON VAMPIRE BAT (DESMODUS ROTUNDUS). Josua F. Richards and David Morton, Department of Biological Sciences, Wright State University, Dayton, Ohio 45435.

10:10

As part of our investigation of fluid transport across the stomach wall of the sanguivorous common vampire bat, feeding bats were videotaped. While feeding, a 25.25 gm bat extended its tongue into CDP diluted blood and retracted it into the mouth an average of 3.2 times/second with a maximum rate of 4.3 times/second. About 3 µl of blood were delivered to the mouth with each cycle of the tongue. This amount is approximately equal to the volume of the paired longitudinal grooves on the ventral surface of the tongue. Drips of urine were observed as short as 2.83 minutes after the start of feeding. Transport across the stomach wall is the rate limiting step for movement of the excess water contained in a blood meal to the circulatory system and through the urinary system. The average weight loss due to micturation during feeding and for about 25 minutes after feeding had ceased was 87.3 mg/min. At this point, the rate of weight loss decreased rapidly.

EFFECT OF HYPOTHYROIDISM ON ADRENAL ULTRASTRUCTURE IN STRESSED AND UNSTRESSED YOUNG RATS. Denise Schulte, Department of Biology, Bowling Green State University, Bowling Green, OH 43403

10:25

Rat pups were made hypothyroid by administering a thiouracil diet to the mothers during gestation and lactation. At 15 days of age, pups were subjected to ether stress or exogenous ACTH, and adrenal cortex ultrastructure of the hypothyroid animals was quantitatively examined by stereological means and compared with that of euthyroid pups in the same stimulus groups. It appeared that hypothyroidism depressed both the normal lipid droplet production in the control animals and the actual release of the secretory droplets from the cortical cells in response to stress.

Morphology of the Bat Flea, Myodopsylla insignis (Siphonaptera:Ischnopsyllidae) with special reference to the pygidium. Stephen A. Smith and Mary Ellen Clay, Department of Entomology, The Ohio State University, Columbus, Ohio 43210.

10:40

Bats, like other mammals, are subject to parasitism by blood-sucking fleas. Initial collections of the flea Myodopsylla insignis were made from a natural population of the Little Brown Bat, Myotis lucifugus near Butler, Ohio. One of the main objectives of our investigation is to elucidate the structure and function of the pygidium and its possible role in the sexual behavior of fleas. The pygidium, often termed sensillium, is located on the tenth abdominal segment of the flea and as with many fleas demonstrates strong sexual dimorphism. In specimens prepared for scanning electron microscopy the pygidium has been shown to be comprised of many circular depressions and at least two different types of hair-like structures. The first type, called a trichobothria, is long and set within the circular depression and is surrounded by eight evenly spaced cuticular pegs. The second type is composed of numerous smaller hook-like cuticular spines located in all the area of the pygidium other than the circular depressions. Cross-sections of the pygidium viewed via transmission electron microscopy have shown the trichobothria to have associated internal cellular components.

A. ZOOLOGY

FIRST AFTERNOON SESSION

ENGINEERING-SCIENCE 1047

ANDREW M. WHITE, PRESIDING

1:30 Business Meeting

ENVIRONMENTAL FACTORS IN THE GROWTH AND REPRODUCTION OF FRESHWATER BRYOZOA.

2:00 Timothy S. Wood, Department of Biological Sciences, Wright State University, Dayton, Ohio 45435.

An improvement in rearing techniques has made possible the continuous laboratory maintenance of phylactolaemate bryozoan colonies throughout many generations. Since reproduction in this animal group is mainly asexual, clones are easily developed for experimental purposes. Using simple techniques, it has been possible to identify the relationship between specific environmental conditions and colony growth and reproduction, including the onset of gametogenesis and the formation of various statoblast types. To some extent, the number of tentacles, various body dimensions, and the mode of colony growth can also be definitely linked to environmental factors. These findings shed new light on the nature of intraspecific variation in several bryozoan species, and they reveal interesting adaptive responses of bryozoan colonies to fluctuations in their environment.

HABITAT SELECTIVITY OF TROUT-PERCH LARVAE IN THE CONNEAUT HARBOR AREA OF LAKE ERIE. Ruth C. Krassenstein, Department of Biology, John Carroll University, Cleveland, Ohio 44118.

2:15

Larval Trout-perch (*Percopsis omiscomaycus*) were collected by standerd replicate ichthyoplankton tows at six sites in and near the Conneaut Harbon between 1 may and 15 August, 1978. Sample sites were chosen to include two "protected" areas immediately inside the breakwalls, two "unprotected" areas immediately outside these walls in Lake Erie, a location in the open-water area of mid-harbor and a beach area just west of the harbor. In all areas the frequency of Trout-perch larval forms increased through the month of May, peaked in mid-June and declined thereafter. Throughout the sampling period, sites offering protection from wave action produced higher numbers of larvae per cubic meter of water than all other sites. Open lake sites near the breakwalls and at the beach yielded moderate numbers of larvae while the site in mid-harbor exhibited the fewest larvae. These data suggest that artifically created areas of protected waters may be an extremely important factor in the production of Trout-perch in the Central Basin of Lake Erie, and further that breakwalls in general may serve as acceptable and perhaps equivalent areas of production when compared to available beach spawning areas.

SPAWNING SITE PREFERENCES FOR NORTHERN PIKE (*Esox lucius*) IN A NEW YORK MARSH WITH WIDELY FLUCTUATING WATER LEVELS. Norman A. Alldridge, Case-Western Reserve University , Cleveland,Ohio; and Andrew M. White,
2:30 John Carroll University, Cleveland, Ohio.

Numerous literature accounts of the spawning of Northern Pike indicate that the species spawns over substrates of flooded terrestrial grasses, early in spring. In the spring of 1979 we studied an area in Conesus Lake, New York in which water levels of the marsh fluctuated widely during the spawning season. Available substrates for spawning included flooded areas of Canary Grass, Rice Cut Grass, Cattail, leaf litter, pondweeds, Polygonums, Buttonbush, old field forbs, sawdust and brushpiles and bulrushes. More than 140 observations of spawning indicated that preferences were correlated with depth, not vegetation type and that as depths changed in the marsh, substrates utilized shifted accordingly. Further, heavy or thick types of vegetation (Cattail,Buttonbush, brush) were consistantly avoided. These results indicate that the spawning of the Northern Pike occurs in open water areas, over any available vegetation so long as depths were within the range of approximately 6 to 24 inches, (12.06 ± 3.01 inches) and Cattail, brush or bushes were absent. Spawning occurred consistantly at temperatures above 5.5 C and on days when the area was iced spawning was delayed until late afternoon.

DISTRIBUTION OF EARLY FISH LARVAL STAGES IN THE LOWER CHAGRIN RIVER AND ADJACENT LAKE ERIE BEACHES. Andrew M. White, John Carroll University, Cleveland, Ohio and Norman A. Alldridge, Case-Western
2:45 Reserve University, Cleveland, Ohio.

Between March 15 and September 1, 1977, ichthyoplankton samples were collected at two beach stations adjacent to the Chagrin River mouth in Lake Erie and at three sites within the lower 1/8 mile of the river. Thirty-four taxa of early larval stages were collected, nearly all exclusively from the riverine areas. Gizzardshad, Carp, Emerald and Spottail Shiners, Channel Catfish, Drum, Trout-perch, Centrarchids, Logperch Darters and Yellow Perch were studied in greater detail since they occurred in both the lake and riverine areas. With the exception of Trout-perch, Emerald and Spottail Shiners, all species were more abundant in the estuary than in the lake. An examination of available habitats at each sample location demonstrated thatdifferences in the distribution of the early stages was related to habitat type. Further, these areas were separated by distances which were only a few hundred feet. These data demonstrate that studies of ichthyoplankton in open lake areas of the central basin serve to document only a portion (often very small) of the total area production; more importantly, that very minor modifications of estuarine areas could have very extreme negative effects on annual production of certain species in local areas.

NEARSHORE ICHTHYOPLANKTON DENSITIES IN THE WESTERN BASIN OF LAKE ERIE - 1977.
John J. Mizera, C. Lawrence Cooper and Charles E. Herdendorf. Center for Lake Erie Area Research, The Ohio State University, Columbus, Ohio 43210

3:00

An intensive survey of ichthyoplankton was conducted in a portion of the nearshore zone of the western basin extending from Stoney Point, Michigan, to Locust Point, Ohio, including Maumee Bay. The sampling period extended from April 14 to July 8. Previous studies indicate the nearshore zone is an important spawning and nursery area for many species of Lake Erie fish. The purpose of this investigation was to determine the spatial and temporal distribution of fish larvae within the study area.

A total of seventeen (17) species of fish larvae were collected in Michigan waters. In Ohio waters, fifteen (15) species occurred in collections from Maumee Bay and sixteen (16) species in collections taken along the shoreline east of Maumee Bay. The most abundant sport and commercial fish species encountered were freshwater drum (Aplodinotus grunniens), walleye (Stizostedion vitreum), white bass (Morone chrysops) and yellow perch (Perca flavescens). The most abundant forage fish species encountered were emerald shiners (Notropis atherinoides) and gizzard shad (Dorosoma cepedianum). The occurrence of lake whitefish (Coregonus clupeaformis) in samples from Ohio and Michigan is particularly noteworthy.

LACTATE DEHYDROGENASE ISOZYME PATTERN OF NATURAL LONGNOSE DACE X BLACKNOSE DACE HYBRIDS. Fenton D. Moore and Andrew M. White, Department of Biology, John Carroll University, Cleveland, OH. 44118.

3:10

During a study of enzyme polymorphism in Chagrin River populations of Longnose Dace (*Rhinichthys cataractae*) we observed an exceptional pattern of cytosolic lactate dehydrogenase (LDH) in nine specimens of the 179 examined. Although the specimens possessing the exceptional pattern exhibited Longnose Dace coloration, pigmentation and general body form, morphometric examination revealed that the lateral line scale counts were low, (range 57-63) and that the eye diameter to snout length ratio was consistantly less than 1.8. Scale counts for the remainder of the population (n=107) were 69.3 ± 4.2 and the eye to snout ratio was 2.37 ± 0.21. These data suggested that the specimens might be hybrids with another species, thus we conducted an electrophoretic investigation to determine other possible parental species. Of all other species examined, only the Blacknose Dace (*Rhinichthyes atratulus*) possessed LDH isozymes with the appropriate mobility. Mixtures of liver extracts from both dace produced a pattern indistinguishable from the exceptional pattern. We feel that the combination of the mixed LDH isozyme pattern and the intermediate morphometric characters indicate that these specimens represent naturally occuring hybrids of these two similar species.

THE EFFECT OF ALPHA-CHLOROHYDRIN ON THE FERTILITY OF WHITE RATS
Hailu Kassa, Environmental Studies Center, Bowling Green State University, Bowling Green, Ohio 43403

3:20

Alpha-chlorohydrin (3-chloro-1, 2 - propanediol) is a rodenticide as well as a chemosterilant. Male white rats (Sprague-Dawley) were presented a choice of 1% bait and EPA challenge diet for 3 days. This was followed by 7 days post-observation period, after which time 5 of the treated animals were co-habited with normal females for 2 weeks. The remaining 5 animals were sacrificed and the epididymis examined for gross anatomical lesions and motile sperm. After the 2 week period the females were sacrificed and their uteri examined for implantation sites. Males also were sacrificed; the epididymis and testis were preserved and prepared with H & E stains.

All male rats surviving a feeding test were sterile; none of the matings was successful. Rats consuming 70 mg/kg had few motile sperms, and no macroscopic lesions were apparent. At higher doses (>100 mg/kg) there were macroscopic lesions with the formation of spermatocoel and sperm granuloma. Both the seminiferous tubules and epididymal lumen were devoid of spermatozoa. Spermatogenesis was arrested in the testis. However, the leydig cells were not affected. The pseudostratified columnar cells had exfoliated, and the basal epithelial cells were separated from the basement membrane. At lower doses this compound affects maturation of the spermatozoa, while at higher doses it blocks sperm transfer, arrests spermatogenesis, and induces structural changes of the epididymis and testis.

A. ZOOLOGY

SECOND AFTERNOON SESSION:
ENGINEERING-SCIENCE 1201
LEE ST. JOHN, PRESIDING

2:00 RESOURCE PARTITIONING IN WOODPECKERS: BILL LENGTHS AND FOOD SIZE, Paul E. Woods, Dept. of Zoology, Miami University, Oxford, Ohio 45056

Resource partitioning was analyzed by means of culmen lengths and an analysis of food item size utilization in a bark-drilling guild of seven sympatric woodpeckers. Ratios of bill sizes calculated for species pairs adjacent in bill size ranged from 1.02 to 1.47. The species pairs, arranged from small-billed to large-billed species, were plotted against the culmen ratios. The resulting plot approximated the quadratic function $1.74 - 0.43X + 0.56X^2 = Y$. $r^2 = 0.97$. Mean beetle size was plotted against culmen lengths. The resulting plot approximated the function $1.91 + 0.27X = Y$, $r^2 = 0.61$. It is concluded that species pairs with large culmen ratios feed on relatively rare food items. Species pairs with small culmen ratios are expected to partition resources by means other than food size.

2:15 ELECTRORETINOGRAPHIC RESPONSES OF VARIOUS OWL SPECIES. Steven J. Ault, Department of Biology, The University of Akron, Akron, Ohio 44325

Electroretinograms (ERGs) are a summed response of the electrical activity generated by the retina in response to light stimulation. ERGs have been recorded for 3 owl species; barred (Strix varia), screech (Otus asio), and great horned (Bubo virginianus). These owls, all commonly found in Ohio, are typically nocturnal in their activity and possess retinas dominated primarily by a high concentration of rods. The ERG results I obtained show a typical pattern associated with primarily rod retinas. Flicker ERGs also indicated residual cone responses at high luminance levels and high flicker frequencies.

2:25 O_2 TRANSPORT IN WATERFOWL FROM SEA LEVEL AND HIGH ALTITUDE. Craig Patrick Black, Department of Biology, University of Toledo, Toledo, Ohio 43606

In bird embryos, the oxygen required for oxydative metabolism during development reaches embryonic tissues via a three step process: 1) diffusion through the shell and two underlying shell membranes to blood in the capillaries of the chorioallantoic membrane, 2) transport by blood to tissues, and 3) diffusion from blood to the tissues. At high altitude the oxygen partial pressure (pO_2) in the atmosphere is reduced, resulting in a decreased oxygen partial pressure difference between atmosphere and tissue. In addition, because of the increase in gas diffusion coefficient that occurs with increased altitude, shell permeability in eggs from high altitude must also be reduced to avoid excess water loss from the embryo.

Eggs from bar-headed geese (Anser indicus), a species which breeds in the wild at extreme altitudes in the himalayas were compared to those from canada geese (Branta canadensis). Eggs from both species were laid at altitude 1700 meters. Bar-headed goose eggs showed shell permeability 25% lower than canada goose eggs. Although this would prevent embryo desiccation at extreme altitude, it also results in pO_2 values under the shell lower than those from canada goose eggs at all stages of development. To compensate for this, bar-headed goose embryonic hemoglobin was found to have increased oxygen affinity during all stages of development.

BARN OWL NESTINGS IN OHIO IN 1979 AND POSSIBLE MANAGEMENT TECHNIQUES
Bruce A. Colvin, Department of Biology, John Carroll University, University Heights, Ohio 44118

2:40

Information was compiled on the nesting success of eight pairs of barn owls (Tyto alba) in Ohio during the summer of 1979. Five nests were in Wayne County and one each in Holmes, Pickaway, and Stark Counties. Six pairs nested in barns, the Pickaway County pair in a chimney, and the Stark County pair in a silo. The number of eggs laid ranged from three to seven with an average of 5.1 per nest. Two pairs hatched no young, three pairs hatched young but were still unsuccessful, while one pair fledged three and two other pairs fledged six each. The Stark County pair failed due to the destruction of the silo, but two young were raised and released by the Ohio Division of Wildlife. No nesting took place at a Ross County site where barn owls had nested for ten years in a chimney, although two adult owls roosted in a nearby barn all summer. Low nesting success as observed in these pairs of owls (17 young fledged) could be one factor in the significant decrease of the barn owl in Ohio in recent years. Certain management techniques could aid in restoration of the barn owl in Ohio. These techniques include the use of nest boxes, transfer of orphaned young to other nests, and proper land management.

EFFECT OF ASBESTOS FIBERS ON FILTER FEEDING CRUSTACEA. Karl Schurr, Department of Biological Sciences, Bowling Green State University, Bowling Green, OH 43403.

2:50

Asbestos fibers, in concentrations similar to those found from industrial pollution, caused significant mortality in laboratory tests with brine shrimp. A similar mortality can be expected for natural populations of invertebrates which occupy corresponding trophic levels. This is the first documentation of asbestos as a major hazard for aquatic invertebrates.

THE BENEFIT OF THE HOME SCAR TO PULMONATE LIMPETS. G.C. Woelfl, S.B. Cook and C.B. Cook, Dept. of Zoology, Ohio State University, Columbus, Ohio. 43210

3:10

Homing, the consistent return to a 'home scar', is found among several species of intertidal prosobranch and pulmonate limpets but the benefit of this behavior to limpets has not been demonstrated. To reduce the rate of desiccation experienced by limpets during low tide aerial exposure may be one function of the home scar. Chloride concentrations of mantle cavity fluids of Siphonaria alternata in the Florida Keys were measured after periods of daytime, low tide exposure and used as a criterion for water loss, i.e., desiccation. Experimental limpets were prevented from returning to their home scars after grazing at ebb tide by covering the scars with bits of modelling clay. Controls were free to home. Chloride concentrations of controls increased with increasing amount of exposure so that after 8 hours these limpets retained 53% of their total body water. Experimental limpets retained only 43% of their total body water after the same amount of exposure. These data indicate that desiccation is experienced by limpets during daytime, low tide exposure and that the home scar serves to reduce this physiological stress to the animal. This work was funded by a grant from the Society of the Sigma Xi.

TERRITORY SIZE IN THE BELTED KINGFISHER (Megaceryle alcyon). Wm James Davis University of Cincinnati, Dept. of Biology, Cincinnati, Ohio, 45219.

3:25

The Belted Kingfisher is essentially a non-migratory bird that defends both a breeding and non-breeding territory in wetland communities in Ohio. Sizes of non-breeding territories along Indian and Dry Fork Creeks in South Western Ohio were found to be inversely related to food availability. Fish, the primary food of the Kingfisher, were sampled both by electroshocking and seining. During the breeding season (Mid. April to Mid. July), territories are limited to stream sections that possess suitable nesting sites. An optimal nest site is an exposed bank of sandy composition and sufficient height to be above the level of flood water. There appears to be a weaker correlation between territory size and food abundance during the breeding season then during the non-breeding season.

Territory size was determined by direct observation of birds after they were banded and color marked. In this species, territorial behavior serves in obtaining both an appropriate nest site and sufficient food. Breeding territories appear larger than necessary for satisfying food requirements, but this could be explained by the scarcity of available food during adverse environmental conditions, e.g., flooding and increased turbidity of the water.

B. PLANT SCIENCES

FIRST MORNING SESSION

ENGINEERING-SCIENCE 2046

ROBERT C. ROMANS, PRESIDING

NON BOTRYOPTERIS GLOBOSA-LIKE SPORANGIA FROM NORTH AMERICA. Charles W. Good. Department of Botany, Ohio State University, Lima, Ohio 45894.

9:00

Small globose sporangia bearing spiny triangular spores are described from coal ball ball deposits of middle and upper Pennsylvanian age in Kansas, Illinois, and Ohio. Sporangia are almost spherical, about 35mu in diameter, and are borne singly on short stalks. Sporangia and spores appear very similar to similar sporangia known attached to lower Pennsylvanian age species of Botryopteris and Psalixochlaena. Association and possible of the North American sporangia to axes resembling those of Botryopteris suggests that not all North American botryopterids bore B. globosa like sporangial aggregations, as is commonly believed. The occurrence of botryopterid sporangia similar to those described here throughout the Pennsylvanian and into the Mississippean suggests that plants currently placed in the genus Botryopteris fall into two major groups which should be separated at the generic level.

PENNSYLVANIAN ENDOMYCORRHIZAL FUNGI. Cynthia A. Wagner, Department of Botany, The Ohio State University, Columbus, OH 43210.

9:15

Fungal spores and mycelial remains from Pennsylvanian coal balls are currently under investigation. The spores, found both dispersed and clustered throughout leaf litter, are globose, 100-150 μ in diameter, and apparently thick-walled with two or more wall layers. Some of the spores are attached to a thick-walled hyphal "stalk". Non-septate hyphal fragments have been found in proximity to similar spores in association with the staminate cone Lasiostrobus polysacci. The hyphae are thin-walled and appear irregularly contoured, and demonstrate a characteristic angular branching. Terminal portions of some of the hyphae have given rise to vesicle-like structures, none of which are delimited by a septum. The fungi are being examined using the cellulose peel technique and scanning electron microscopy for morphology and fine structure, habit and development, and are being compared to extant fungal groups to determine possible taxonomic affinities. The various groups of fossil spores appear to be related and show striking similarity in form and habit to extant members of the Endogonaeeae, a family containing a large number of species known to produce endomycorrhizae of the vesicular-arbuscular type.

VEGETATIVE AND FERTILE SHOOTS OF AN UPPER PENNSYLVANIAN WOODY LYCOPSID Kathleen B. Pigg and Gar W. Rothwell, Department of Botany, Ohio University, Athens, Ohio 45701

9:30

Recently, the cormose base of a new woody lycopsid was described from Upper Pennsylvanian sediments of eastern Ohio. The above-ground parts of the plant include both vegetative and fertile shoots. Stems have exarch protosteles surrounded by abundant wood, cortex, and leaves. Split coal-ball surfaces show leaf bases and epidermis. The leaves have paired leaf traces and hollow areas that may represent parichnos. Ligules are present, as are hairs and sunken stomata. Fertile shoots consist both of fertile zones and more tightly aggregated bisporangiate cones. The largest cone measures 17.2 cm long with microsporangia at one end and megasporangia at the other. Trabeculae like those of Isoetes characterize the microsporangia. Microspores are of the Endosporites type, and megaspores conform to Valvisporites. Affinities of this plant are with Polysporia and possibly also with Sporangiostrobus.

PERMINERALIZED LYCOPOD EMBRYOS FROM THE UPPER CARBONIFEROUS OF ENGLAND. Sara P. Stubblefield. Department of Botany, Ohio University, Athens, Ohio 45701

9:45

Permineralized lycopod megagametophytes and embryos are described from Upper Carboniferous strata in Burnley, Lancashire. Embryos are found for the first time in megaspores identical to those produced by Bothrodendrostrobus. Megaspores are approximately 1 mm in maximum diameter and bear numerous hollow, branching spines and a prominent apical papilla. Megagametophytes are like those of Isoetes and Selaginella and are found entirely within the megaspore. Megaspores contain embryos in several stages of development. The smallest embryos are globular and unvascularized. The largest are vascularized and show what appear to be the first leaf and root as well as protuberances at the surface in the position of the ligule and second leaf in Isoetes and Stylites embryos of similar size and development.

PSARONIUS FROM THE DUQUESNE COAL OF EASTERN OHIO. James E. Mickle. Department of Botany, Ohio University, Athens, Ohio 45701

10:00

Several stems of Psaronius, preserved in coal balls from a single outcrop of the Duquesne coal (Late Pennsylvanian age) in eastern Ohio, are described. Based on anatomical features, three distinct structural forms are present. The first structural form is similar to P. chasei Morgan with spiral phyllotaxy and abundant tannin cells in the ground tissue. This is the most commonly encountered form at this locality. The second structural form is characterized by numerous vascular cycles with prominent sclerenchymatous zones between each cycle, whorled leaf arrangement, and numerous tannin cells in the ground tissue. The third structural form displays 3-5 vascular cycles with distichous leaf arrangement, schizogenous lacunae in the ground tissue, and an absence of tannin cells. The second and third forms possess previously undescribed combinations of anatomical features for American Psaronius specimens. Relationships among these three forms are discussed in terms of currently recognized taxonomic criteria.

PRELIMINARY STUDY OF PSARONIUS PHLOEM. Edith L. Smoot and Thomas N. Taylor Department of Botany, The Ohio State University, Columbus, OH 43210.

10:15

Phloem anatomy of a Psaronius species is described based on coal ball material collected at the Lewis Creek, Kentucky locality (Lower Pennsylvanian). Specimens consist of segments with generally poorly preserved tissues. Within the stems are a few C-shaped vascular segments with well-preserved xylem and phloem. These segments may represent leaf traces or cauline segments. The central bar of metaxylem tracheids is completely surrounded by a 3-cell wide zone of sheath parenchyma, which may be distinguished from phloem parenchyma by its relatively thinner walls. The abaxial phloem contains a central continuous band of larger diameter sieve elements that is bordered on either side by phloem parenchyma zones up to 4 cells in width. The abaxial phloem contains the same cell types as the adaxial side, but they are more extensive abaxially. The adaxial phloem consists of a discontinuous row of sieve elements with only 1 layer of phloem parenchyma on either side. Sieve elements extend up to 120 um in length and have oblique, rounded end walls. They are arranged in continuous vertical series, and longer elements are subdivided by thin, almost translucent horizontally-oriented cross walls. Between the phloem parenchyma and the sheath parenchyma on the abaxial side of the xylem trace are a number of small diameter (8 um) cells with slightly thicker walls, which may represent protophloem. The phloem anatomy of the Carboniferous age Psaronius can be directly compared with that of extant marattialeans.

MICROTOPOGRAPHIC VARIATION AROUND FLOODPLAIN TREES AFFECTS DENSITY OF HERBACEOUS SPECIES. E. Dennis Hardin and Warren A. Wistendahl, Department of Botany, Ohio University, Athens, OH 45701.

10:30

Litter from floods is deposited on the upstream side of a floodplain tree while scouring forms a depression in the soil on a downstream side of a tree. These processes create a pattern of microtopography distinct to floodplain trees and affect the horizontal and vertical distributional pattern of herbaceous vegetation. Stems of annual and perennial herbs were counted in a mature floodplain community on the Hocking River where the summer herbaceous canopy is dominated by Laportea canadensis, Impatiens pallida, and Cryptotaenia canadensis. Ten paired samples of points with and without trees were established randomly and counts of herbaceous stems were made in a linear series of four 0.2 X 0.5 meter quadrats along four compass lines from each point. The mean number of stems rooted in the quadrats was significantly ($p<.05$) different among lines with trees but was not significantly different among lines around points without trees. The mean number of stems was significantly lower downstream of trees than either upstream of trees or around points without trees. Quadrats upstream of trees did not differ significantly in the number of stems per quadrat than those around points without trees.

FORAGING PATTERNS OF BUMBLEBEE POLLINATORS ON SUBARCTIC VEGETATION. Lazarus Walter Macior. Department of Biology, The University of Akron, Akron, Ohio 44325.

10:45

Queen and worker bumblebees (Bombus Latr.) foraging for nectar and/or pollen on 14 plant species in the Boraginaceae, Fabaceae, Gentianaceae, Onagraceae, Ranunculaceae and Scrophulariaceae were studied for two seasons in the St. Elias Mountains of the Yukon Territory, Canada. The number of Bombus species per plant species ranged from 2 to 13. The ratio of queen to worker pollinators on a plant species was directly related to the plant's blooming season, earlier species having relatively more queens and later ones more workers. Greater frequencies of particular Bombus species on a plant appeared functionally related not only to blooming season but also to floral form and altitudinal distribution of plants and pollinating insects. Bombus species with longer proboscides and greater altitudinal ranges tended to occur on more plant species. No evidence of partitioning of floral resources among bumblebee species was identified. An analysis of corbicular pollen loads from Bombus foragers indicating comparable numbers of monolectic and polylectic foraging forays suggested that floral fidelity of foragers in a subarctic stress environment may be less than that expected in temperate ones. Since relatively few foragers carried only pollen foreign to the plant on which they were captured, it was concluded that foragers normally gather pollen and nectar where both are available. No evidence was found to support a concept of competition of pollinators for floral resources nor of flowers for pollinator service.

B. PLANT SCIENCES

SECOND MORNING SESSION

ENGINEERING-SCIENCE 2047

T. RICHARD FISHER, PRESIDING

STUDIES ON THE EFFECTS OF HEAT ON EXISTING POWDERY MILDEW INFECTIONS OF BEGONIA. by J.A. Quinn and C.C. Powell Jr., Dept. of Plant Pathology, O.S.U., Columbus, OH 43210 and OARDC, Wooster OH 44691.

9:00

Experiments performed on excised Hiemalis begonia leaves with 7 day old infections demonstrated that conidia were more vulnerable to heat treatment than haustoria. 3 days at 28 C caused total loss of germinability of preexisting conidia associated with the infections. 50 percent of the haustoria still appeared normal and functional after 1 week at 28 C. The percentage of apparently normal haustoria declined with increasing heat exposure, but 6 percent still seemed normal after 2 weeks at 28 C. Heat treatment was also associated with encapsulation of haustoria with intracellular substances. Mildew infections on plants heated for 2 weeks at 28 C and then incubated at 21 C recovered after 14 days and began to sporulate. Treatment at 40 C caused more rapid destruction of the fungus, but was toxic to the host. Heat treatment alone does not appear satisfactory to eradicate powdery mildew from begonias. In fact, it may trigger a haustorial encapsulation process which could serve as a dormancy structure.

LIFE CYCLE STUDIES ON *SORODISCUS COKERI* (PLASMODIOPHORACEAE) Russell K. Robbins and Charles E. Miller, Ohio University, Department of Botany, Athens, Ohio 45701

9:15

Sorodiscus cokeri Goldi-Smith is an obligate, endobiotic fungal parasite of a water-mold fungus, an alga, and two vasuclar plants. This holocarpic parasite was recently isolated with its host (*Pythium*) into two membered axenic culture from dried soils collected from the City Park, Florence, S.C. in November 1977.

Zoospore infections result in the formation of plasmodia which eventually develop into either sporangia or cystosori. The sporangia are multilobed and their shape is influenced by host cell hypertrophy caused by the response of the host to the parasite. The cystosori are disc-shaped and composed of two layers of closely packed cysts. The cystosori are also arranged in triads, tetrads, and hollow hemispheres.

The life cycle of *Sorodiscus cokeri* is being studied at the light microscope and electron microscope levels. Host/range studies of this parasite in water mold taxa (Oomycetes), including species of *Pythium, Achlya, Saprolegnia,* and *Dictyuchus* are currently under way.

THE HOST RANGE OF WORONINA PYTHII. Daniel P. Dylewski, Charles E. Miller and James P. Braselton. Dept. of Botany, Ohio University, Athens, Ohio 45701.

9:30

Woronina pythii Goldie-Smith is a holocarpic, endobiotic, obligate parasite of the genus Pythium. The host range and cystosoral shape of this aquatic fungus were investigated in an attempt to clarify the taxonomic position of W. pythii within the Plasmodiophoromycetes. Sesame seed cultures of test-species were grown axenically in individual Petri dishes for 24 hr and inoculated with swimming secondary zoospores of the parasite at 24 hr intervals for 72 hr. The following species were successfully infected: Pythiaceae - nine species of Pythium. Woronina pythii did not infect the following organisms: Pythiaceae - four species of Phytophthora; Saprolegniaceae - four species of Saprolegnia, twenty six species of Achlya, one species of Aphanomyces and one species of Dictyuchus. These results were consistant with the findings of Goldie-Smith, that is, W. pythii was capable of infecting only species of Pythium. In contrast with the observations of earlier researchers, however, cystosoral shape of our isolate of W. pythii differed for each Pythium species it parasitized.

SUBSTRATE INFLUENCED MORPHOLOGICAL VARIATION IN SOME SPECIES OF *SAPROLEGNIA* AND *ACHLYA* (SAPROLEGNIACEAE)

9:45

Robert W. Martin and Charles E. Miller, Department of Botany, Ohio University, Athens, Ohio 45701

Substrate influenced variation was studied by growing the water-mold fungi, *Saprolegnia ferax* (Gruith.) Thuret, *S. subterranea* (Dissmann) Seymour, *S. asterophora* de Bary, *S. dialina* Humphrey, *Achlya polyandra* Hildebrand, and *A. flagellata* Coker on three different substrates. Single spores of the same age, of the above taxa, were germinated and grown on a low nutrient agar medium. Three experimental substrates, hemp seeds (*Cannabis sativa* L.), sesame seeds (*Sesamum indicum* L.), and fruit flies (*Drosophila melanogaster*) were used. Each sterilized, experimental substrate was placed 1 mm from the leading edge of each water mold growing on the low nutrient medium. The cultures were incubated at 17°C for 12 hours. After incubation, each experimental substrate was axenically removed from the agar culture and placed separately in sterilized petri dishes containing Emerson's water. Water cultures were examined at 12 hour intervals, and measurements of morphological characteristics classically utilized as taxonomic characters were made. Analysis of variance between the growth of the experimental taxa on different substrates was determined using Student's T test. The results show that many morphological characteristics are substrate dependent and consequently unstable as taxonomic characters.

ISOLATION OF THE COPROPHILOUS FUNGUS, PILOBOLUS, FROM LAKE COUNTY, OHIO.

10:00

James B. Rakestraw, Jr., College of Wooster, Wooster, Ohio 44691, and K. Michael Foos, Lake Erie College, Painesville, Ohio 44077.

Four species of the coprophilous zygomycete, Pilobolus, were collected from dung in Lake County, Ohio. Pilobolus has been collected and reported from many areas in North America and Europe, but there have been no collections recorded from Ohio.

Isolates of Pilobolus were collected from dung of sheep, pigs, horses, ponies, dairy and beef cattle. These isolates were cultured on various media including: dung, natural media and a synthetic medium. Growth characteristics of the isolates were compared for each of the media.

The four species of Pilobolus were identified as: P. crystallinus (Wiggers) Tode, P. kleinii van Tieghem, P. longipes van Tieghem, and P. oedipus Montagne.

SPORULATION OF BIPOLARIS MAYDIS RACE T ON RESISTANT AND SUSCEPTIBLE CORN LEAVES: RELATION TO ROLE OF LEAF LEACHATES. T. J. Harrison and M. O. Garraway. Department of Plant Pathology, The Ohio State University, Columbus, OH 43210, and Ohio Agricultural Research and Development Center, Wooster, OH 44691.

10:10

B. maydis race T (BMT) produces significantly more spores and causes more electrolyte leakage on infected susceptible corn leaves than on infected resistant leaves. To study the relationship of increased leakage to increased sporulation we grew the fungus on media consisting of 2% agar plus leachates from either infected susceptible or infected resistant leaves then measured sporulation. Sporulation is comparable on either medium. Also, sporulation is comparable on agar media containing increasing concentrations of a synthetic-mixture (L-asparagine + mineral salts) deficient in carbohydrate. Thus, leaf leachates are not the sole source of nutrients for sporulation of BMT on corn leaves. Corn cell walls are a potential source of carbohydrates for growth and sporulation of BMT in infected tissues. Therefore, we tested the effect of a carbohydrate amendment to agar media on the sporulation response of BMT to leaf leachates and to a synthetic mixture. On carbohydrate amended agar sporulation of BMT is significantly higher with leachates from infected susceptible than with leachates from infected resistant leaves. Also, on amended agar sporulation increases with increasing concentrations of a synthetic mixture. Thus, sporulation of BMT on infected corn leaves is determined not only by the amount of nutrients in leaf leachates, but by the availability of carbohydrates in the cell walls with which the fungus is in contact.

STIMULATION OF RHIZOMORPH PRODUCTION IN ARMILLARIA MELLEA BY A PHENOL. Debra Longworth and M. O. Garraway. Department of Plant Pathology, The Ohio State University, Columbus, OH 43210, and Ohio Agricultural Research and Development Center, Wooster, OH 44691.

10:25

Armillaria mellea is a fungus belonging to the Agaricaceae which causes root rot in a variety of plant species. The pathogen's primary means of survival and localized spread are organized hyphal structures called rhizomorphs. The importance of rhizomorphs in the epidemiology of Armillaria root rots provides an impetus for the study of nutritional factors that regulate rhizomorph initiation and growth. Ethanol has been shown to induce rhizomorph initiation and growth in a completely defined culture medium. The mechanism by which ethanol functions is not yet understood. We found that guaiacol, a monophenol, can induce rhizomorph growth in A. mellea. When 0, 50, 100, or 200 mg/l guaiacol were added to culture media without ethanol, corresponding dry weights were 8, 7, 16, and 14 mg/fungal thallus (mycelia + rhizomorphs). When the same concentrations of guaiacol were added to culture media containing 1000 ul/l ethanol, corresponding dry weights were 28, 46, 64, and 53 mg/fungal thallus. Thus guaiacol increases growth in a medium with or without ethanol. Dry weight increases induced by guaiacol and ethanol were accompanied by increases in polyphenoloxidase. These data suggest that ethanol and guaiacol may stimulate rhizomorph production via similar regulatory mechanisms.

THE TAXONOMIC STATUS OF CRIBRARIA MINUTISSIMA

Harold W. Keller, Department of Microbiology and Immunology
Wright State University, Dayton, Ohio 45435
Mary Jo Buben, 1250 Kevin Drive, Fairborn, Ohio 45324

10:40

Cribraria minutissima was described by Schweinitz in 1832. Since then, monographers have broadly circumscribed this species to include sporangia with a calyculus (cup phase) and without a calyculus (cupless phase). In certain species of Cribraria, C. microcarpa and C. intricata, the calyculus is variable (may be present or absent in the same species). In contrast, the calyculus in C. minutissima is either present or absent and this can be correlated with other distinguishing characteristics such as sporangial size and color, and spore size and color. Scanning electron micrographs show the striking differences in these two kinds of sporangia. Over 70 specimens identified as C. minutissima were examined, including Schweinitz's holotype. The following brief description is based on the holotype as well as specimens that agree with the holotype. The name C. minutissima should be tied to this description. Sporangia stipitate, erect, 0.33 to 1.2 mm in overall height, globoid to more commonly obovate, reddish orange to coppery; calyculus present, occupying 1/3 to 1/2 the lower portion of the spore case, unperforated and sharply delimited from the peridial net; peridium connected to calyculus by pale, smooth, flattened threads that are united above into a wide-meshed network; spores reddish orange in mass, 6.5-9.0 µm in diam. The taxon lacking a calyculus represents a new species which differs from C. minutissima in its smaller sporangial dimensions, bright yellow color, and smaller spores. Supported by grants from the National Science Foundation (BMS75-19098 and DEB75-19098A-01) and the Ohio Biological Survey.

B. PLANT SCIENCES

FIRST AFTERNOON SESSION

ENGINEERING-SCIENCE 2046
LARRY R. YODER, PRESIDING

1:15
Business
Meeting

RANGE EXPANSION OF NATIVE NORTH AMERICAN AQUATIC AND WETLAND SPECIES. Ronald L. Stuckey, Department of Botany, The Ohio State University, Columbus. 43210.

1:45

The expansion of the geographical ranges of native North American aquatic and wetland species has afforded little attention. It is assumed, quite often, that a species discovered as new to an area is one that has been overlooked. A thorough examination of the historical literature and changing habitat conditions may reveal, however, that the species has arrived recently or is proliferating extensively in the new area. Habitat changes are particularly important factors in an analysis determining the degree of range expansion. The building of canals, railroads, highways, ponds, lakes and reservoirs during the past two hundred years has altered the landscape drastically and created numerous new habitats. Case histories of selected examples are: From the east coast, an inland expansion of Typha angustifolia and Juncus gerardii into the great lakes region and farther west via canals, roads, and/or railroads; a northward invasion of mudflat species, such as Rorippa sessiliflora, Ammannia robusta, and Rotala ramosior, of the Mississippi Embayment into the western Lake Erie drainage basin apparently favored by agricultural practices; expansion of Lycopus asper into the Great Lakes region and Alisma gramineum into the St. Lawrence River valley from the Great Plains; a northward invasion of the southern Najas guadalupensis and Cabomba caroliniana into reservoirs and artificial lakes; and expansion of Najas gracillima and Myriophyllum exalbescens, which have disappeared from certain areas, but have invaded newly constructed lakes and reservoirs elsewhere, in southeastern United States and the Great Plains, respectively.

PHYLOGENETIC TREES IN PLANT SYSTEMATICS. Tod F. Stuessy, Vicki A. Funk, and Michael A. Cichan. Department of Botany, The Ohio State University, Columbus, Ohio 43210.

2:00

Phylogenetic tree diagrams have been used for over 100 years to portray the estimated phylogeny of plant groups. These often accompany revisionary studies and usually summarize the classification and evolutionary relationships presented in the revision. Despite their widespread use, most trees do not show many of the possible relationships among the taxa, and frequently the relationships that are shown are ambiguous. This hampers communication about the systematics of the group and impedes comparisons of classifications for several related groups as well as different competing classifications for the same group. A phylogenetic tree which shows many relationships is called a phylogram, and it can contain information such as (1) cladistics (evolutionary branching patterns), (2) chronistics (time of divergence), (3) morphological variation among extant taxa, and (4) patristics (similarity due to common ancestry). Using the genus Lagascea (Compositae) as a model, a method is presented for making a more informative phylogram illustrating the above relationships.

CLADISTICS AND PARALLEL EVOLUTION WITHIN MONTANOA CERV. (COMPOSITAE). V.A. Funk, 1735 Neil Avenue, Department of Botany, Columbus, OH, 43210.

2:15

One goal of systematics is for classifications to reflect evolutionary history. Although one can never be certain what the evolutionary history of a particular group is, the branching patterns can be estimated by cladistic methods. In flowering plants, one problem in developing these patterns is the independent acquisition of similar characters, or parallel evolution. This problem is shown in Montanoa Cerv. which, historically, has been divided into three subgenera based primarily on the size of the flowering heads. This character has evolved in parallel within the genus and is therefore not useful as an indicator of the subgenera. This was shown as a result of a cladistic study of the genus. The three subgenera recognized here represent what are believed to be three monophyletic lines within the genus. The subgenera are based on several characters including: type of receptacular bracts, shape of disc florets, type of achene dispersal, shape of the involucre, and habit. Within two of the three subgenera several prominant characters show parallel evolution including: size of head, length of pales, polyploidy and ecological zonation. Some of these characters are interrelated, for instance, the polyploid species are all large trees growing in cloud forests. Also, the length of the pales increases directly with the size of the head. These results would have been difficult to determine without using cladistics. Failure to determine such parallelisms can result in artificial classifications which are non-predictive and can lead to flase estimations of relationship.

THE GENTIANACEAE AND MENYANTHACEAE OF OHIO. Barbara K. Andreas and Tom S. Cooperrider. Department of Biological Sciences, Kent State University, Kent, Ohio. 44240

2:30

From field studies and a survey of Ohio herbaria, county dot distribution maps and floristic data were prepared for the 13 native and one adventive species of the Gentianaceae and for the one native and one adventive species of the Menyanthaceae found in the Ohio flora. Of the 14 native species, 11 have been proposed for designation as "endangered", "threatened" or "potentially threatened" elements in the Ohio flora. Of the 5 species of the genus Gentiana proposed as "endangered", Gentiana clausa is limited to the glaciated Allegheny plateau in northeastern Ohio; G. villosa is limited to the southernmost counties in the unglaciated Allegheny plateau; G. puberulenta is confined to the Lake and Till Plains of western Ohio; G. alba is limited to western and southcentral Ohio; and G. saponaria, once widely scattered in the western half of Ohio, is now known only from Lucas County.

In Ohio, the distribution ranges for Gentiana crinita and G. procera overlap. Whether these two fringed gentians should be classified as one species or two has been the subject of recent debate. Using a combination of floral characters, Ohio specimens are readily separable into two taxa.

Gentiana andrewsii, G. clausa and G. saponaria appear similar in the field. Careful examination of the vegetative and floral characters can be used to distinguish these taxa.

SYSTEMATICS OF THE ACMELLA AMERICANA POLYPLOID COMPLEX (COMPOSITAE: HELIANTHEAE) IN THE SOUTHEASTEASTERN U.S., MEXICO, AND CENTRAL AMERICA. Robert K. Jansen. Department of Botany, The Ohio State University, Columbus, Ohio, 43210.

2:45

Acmella A. Richard, a genus recently separated from Spilanthes Jacq., is widespread throughout tropical America, Africa, and Asia. Within the southeastern U.S., Mexico, and Central America there is a closely related group of taxa characterized by their orange-yellow ray and disc florets and prostrate perennial habit. These taxa, referred to as the A. americana complex, were previously divided into eight species and eight varieties and forms based on morphological criteria by A. H. Moore. Chromosome counts from approximately two-hundred populations throughout the range of the complex reveal a high degree of polyploidy with taxa at the diploid, tetraploid, and hexaploid levels. Recent morphological, field, and chromosomal investigations support the recognition of five diploid species, each of which is narrowly restricted both geographically and ecologically. Two of the diploids restricted to Belize and eastern Guatemala are known to hybridize in nature. Three tetraploid species, one of which has a variety at the hexaploid level are also recognized. The tetraploids are very widespread and weedy whereas the hexaploid is restricted to marshes in the states of Jalisco and Michoacan, Mexico. In addition to clarifying the relationships among the taxa of the A. americana complex, the present study considers hypotheses concerning the origin of the polyploid taxa.

THE SYSTEMATICS OF TITHONIA DESF.(COMPOSITAE) John C. La Duke Department of Botany, 1735 Neil Ave., The Ohio State University, Columbus, Ohio 43210

3:00

The genus Tithonia consists of 13 taxa distributed throughtout Mexico and Central America. There are nine perennials and four annuals, and all are diploid with n=17. The genus has a diversity of flavonoid compounds, with uncommon compounds, such as methoxylated flavones, chalcones, and aurones, in a number of taxa. The 5-oxygenated flavones characterize the perennials, and the 5-deoxyflavones are restricted to the annuals. These data contribute to the understanding of the evolutionary relationships of the taxa. Morphological data from populations and individual taxa are analysed using principal component and cladistic techniques. The populational analyses provide a measure of the morphological similarity using over 50 characters, and these data support the recognition of the 13 taxa. Two cladistic techniques were used to evaluate the evolutionary relationships between the taxa: parsimony and character compatibility. The two techniques have different assumptions for cladogram construction and result in different arrangements of the taxa relative to one another. The relationships expressed by the flavonoid data, the principal component analysis, and the cladistic analyses provide insights into the evolutionary history of Tithonia.

TAXONOMY AND PHYLOGENY OF AGASTACHE SECTION BRITTONASTRUM (LAMIACEAE). Roger W. Sanders, Botany Department, Ohio State University, 1735 Neil Ave., Columbus, Ohio 43210.

3:15

In Agastache section Brittonastrum (Lamiaceae), comparative morphology and chemistry of flavonoid constituents are used to delimit 14 species and 14 varieties and to estimate the relationships among them. Species limits are defined by discontinuities in variation. The correlation of morphological and chemical characters permits the aligning of taxa and the representation of phylogenetic relationships of the taxa in a dendrogram. Flavonoid profiles are especially useful in aligning morphologically problematical taxa, such as Agastache verticillata and A. eplingiana. The hybrid origin of several taxa, including A. breviflora, A. pringlei, and A. pallida var. coriacea is suggested by the intermediacy and extreme variability of characters within these taxa. Chromosome numbers in 80 populations, representing 12 of the 14 species, are uniformly n = 9 and, thus, provide no systematic information at this level. Three series, Canae, Mexicanae and Micranthae, are newly proposed to accomodate the three primary branches in the dendrogram. Series Mexicanae is circumscribed to include the phylogenetically reticulate species, Agastache breviflora and A. pringlei, which are phenetically closest to the remaining species of Mexicanae.

THE FLAVONOIDS OF MEGALODONTA BECKII (COMPOSITAE). Marvin L. Roberts, Department of Botany, The Ohio State University, Columbus, OH 43210.

3:30

Megalodonta beckii is an amphibious aquatic plant with heterophyllous leaves and emersed radiate flowering heads. It has often been treated taxonomically as a member of the genus Bidens. The flavonoid chemistry of Megalodonta indicates a close similarity to species of certain North American sections of Bidens. All contain aurones and chalcones typical of the Coreopsidinae. Megalodonta has a comparatively reduced flavonoid profile with fewer compounds and less complex patterns of substitution. Organ specific flavonoid profiles are found in Megalodonta and certain species of Bidens. Compounds found in organs of the capitulum are not present in either the emersed entire leaves or the capillary submersed leaves. Qualitative differences associated with leaf morphology are not detectable. The more mesophytic members of Bidens section Platycarpaea are chemically most similar to Megalodonta and also have organ-specific compound distributions. The more xerophytic members of this section and also section Heterodonta have less organ-specificity and have more complex patterns of substitution of the same aglycone types. A new naturally occurring chalcone glycoside links Megalodonta to the North American sections of Bidens but has not been found in other sections of the genus. Cytological data indicate that Megalodonta is a diploid with the same base number as Bidens

THE ADAPTIVE VALUE OF RAY COROLLAS IN HELIANTHUS GROSSESERRATUS (COMPOSITAE). Tod F. Stuessy and Kayleen A. Evans, Department of Botany, The Ohio State University, Columbus, Ohio 43210.

3:45

One of the major concerns in plant evolution is to what extent morphological features are adaptive. To determine the value of a particular character involves (1) developing an hypothesis for the function of the character, and (2) devising a prediction and suitable test. A simple system was used as a model: the neuter ray florets in Helianthus grosseserratus. Because the ray florets do not set seed, the hypothesis is that they function to attract pollinators to the disc florets. If the rays are removed, then fewer pollinators should be attracted. The prediction was tested in control (rayed) and experimental (non-rayed) populations directly by observing pollinator visits and indirectly by determining seed set. Four seasons of field work have shown that: (1) the frequency of visitation and diversity of pollinators were more than twice as great in the rayed vs. non-rayed populations; and (2) in isolated rayed populations, the seed set was twice that of the isolated non-rayed population. The data support the hypothesis that the ray corollas in Helianthus grosseserratus serve to attract pollinators, and that the structures are adaptive.

ULTRASTRUCTURAL OBSERVATION OF THE SYMBIOTIC ASSOCIATION OF THE CAUDATE LEAF APEX OF DIOSCOREA MACROURA HARMS, AND A BACTERIAL ENDOPHYTE. Philip J. Moubray, Department of Biology, The University of Akron, Akron, OH 44325.

4:00

Dioscorea macroura Harms, a member of the economically important Dioscoreaceae, is a woody, vining monocot native to tropical Africa. It was first described by Orr in 1923 as having specialized, thickened leaf apices with 4-6 parallel, internal, elongate glands. Microscopical observations reveal symbiotic bacteria in mucilage that fills these glands. Each gland opens to the adaxial surface of the leaf by a longitudinal slit through which the bacteria are suspected to gain entry. Filamentous epithelial cells, or modified trichomes, surround and project into these glands and are intimately associated with the bacteria. Ontogenetic studies of the leaves using both transmission and scanning microscopy will be discussed.

THE GERMINATION, GROWTH AND NUTRITION OF THE HEMIPARASITE, PEDICULARIS LANCEOLATA MICHX. Vincent K. Lackney, Department of Biology, The University of Akron, Akron, OH 44325.

4:15

Pedicularis lanceolata Michx., the swamp lousewort, is a perennial hemiparasite upon a variety of both woody and herbaceous hosts. Seeds germinated in the laboratory after exposure to cold for a period of five weeks followed by treatment with gibberellic acid at a concentration of 2000 ppm. Seedlings planted without a host were stunted and chlorotic, whereas seedlings planted with either crimson clover (Trifolium incarnatum L.) or wheat (Triticum aestivum L.) as a host were tall with expanded green leaves. Seedlings in sterile culture on a mineral nutrient medium with a low pH had growth similar to seedlings attached to hosts. At a higher pH or when the medium was supplemented with sucrose, fructose, glucose, casein hydrolysate, glutamine, kinetin, gibberellin, or indoleacetic acid growth was stunted with many of the seedlings developing as callus tissue. It is, therefore, probable that Pedicularis lanceolata relies on host attachment for an increased supply of water and minerals with little reliance on the host for organic compounds.

B. PLANT SCIENCES

SECOND AFTERNOON SESSION

ENGINEERING-SCIENCE 2047

REGINALD D. NOBLE, PRESIDING

HEAT STABILITY OF FLAVONOIDS IN TWO SPECIES OF BEGONIA. Timothy W. Weible and Bernard C. Mikula, The Defiance College, Defiance, Ohio 43512.

1:45

Acidic methanol extracts of flavonoid pigment were prepared using fresh leaves, leaves dried at 50°C for two (2) hours, and leaves dried at 50°C for six (6) hours. The extracts were concentrated and developed using two-dimensional paper chromatography. The chromatograms were compared and differing chromatographic patterns were observed. Not only did the heat treated samples differ from the control but also from each other. Therefore, extreme care must be taken when using herbarium specimens for taxonomic, or phytochemical purposes.

SEASONAL CHANGES IN ION CONTENT OF ATRIPLEX TRIANGULARIS AND SALICORNIA EUROPAEA. Terrence E. Riehl. Ohio University, Department of Botany, Athens, Ohio 45701

2:00

The ionic relations of Atriplex triangularis and Salicornia europaea were studied. Field and laboratory measurements were made to try to determine how a halophyte maintains its ionic balance when exposed to high salt stress.

Field specimens of A. triangularis and S. europaea were collected monthly from a saline habitat in Rittman, Ohio. They were separated into their major components and analyzed for Cl^-, Na^+, K^+, Ca^{++}, and Mg^{++} content. Water potential measurements of leaf and soil were also taken. Values up to 2,000μ eq/gfw of Na^+ and Cl^- were found in A. triangularis, while in S. europaea concentrations of these ions in the shoot sometimes exceeded 2,000μ eq/gfw.

THE ASSOCIATION OF N_2 FIXING BACTERIA WITH DERMATOCARPON MINIATUM AND LEPARIA sp. Daphne D. Lambright and Lawrence A. Kapustka
Department of Botany, Miami University, Oxford, Ohio 45056

2:10

A preliminary survey of saxicolous lichens for N_2-fixing activity was conducted in the Lynx Prairie and Buzzardroost Rock Preserves, Adams County, Ohio. Dermatocarpon miniatum and Lepraria sp., both containing Chlorophycean phycobionts, exhibited N_2ase activity as determined by the C_2H_2-reduction assay. SEM micrographs demonstrated the presence of bacteria on and within the lichen thalli. Portions of lichen thalli were macerated and associated diazotroph bacteria were isolated and maintained on N-free media. Free-living, aerobic diazotrophs including members of the Azotobacteraceae were isolated in this manner. The isolated bacteria continued to have N_2ase activity in axenic culture.

Thalli maintained in the laboratory exhibited a decline in N_2ase activity with storage. D. miniatum recollected from the initial sample population revealed no detectable N_2ase activity even though similar diazotrophs were re-isolated from the thalli. These polysymbiotic associations appear to be ephemeral and non-specific. Although the observed rates of N_2-fixation are relatively low, these lichens may derive a significant N gain during periods of diazotroph activity.

WATER POTENTIAL EFFECTS ON N_2 FIXATION IN CYANOBACTERIA. John D. DuBois and Lawrence A. Kapustka
Department of Botany, Miami University, Oxford, Ohio 45056

2:25

The effect of varying water potentials on the N_2 fixation activity in cyanobacteria was studied using intact soil cores and aqueous suspension cultures. Intact soil cores containing Nostoc colonies were collected in plexiglas cylinders from the Lynx Prairie Preserve in Adams County, Ohio. N_2 fixing activity was measured using the acetylene reduction technique. Water potentials were measured using a Wescor Dew Point Microvoltmeter. Aqueous N-free Allen's medium, adjusted to various osmotic potentials (ψo) using polyethylene glycol, was used to determine the effects of water potential on N_2 fixation rates on Anabaena cylindrica (Lemm.) and A. variabilis (Kütz).

Intact soil cores showed a linear decline in N_2 fixing activity with decreasing soil water potentials. The linear regression equation for these data is $Y=10.7X+98.7$, $r=0.904$, where Y equals the acetylene reduction rate as a percentage of the initial rate (prior to dry down of the soil core) and X equals the soil water potential. The aqueous suspension cultures showed very little decline in N_2 fixing activity from $\psi o = -0.5$ to -2.0 atm. From $\psi o = -2.0$ to -3.0 atm there was a sharp decline in activity with complete cessation of activity at $\psi o \simeq -7.0$ atm. These results, along with in situ measures of N_2 fixation, will be used to describe the ecological significance of cyanobacteria in the Lynx Prairie Preserve.

2:40 THE ACID RESPONSE OF PEA STEM SEGMENTS I. AUXIN AND HYDROGEN ION RELATIONSHIP IN THE INITIATION OF RAPID RESPONSES. Marsha A. Forrest and Grant M. Barkley Department of Biological Sciences, Kent State University, 4314 Mahoning Avenue, N.W., Warren, Ohio 44483

The response of excised epicotyl segments of pea (Pisum sativum var. Alaska, var. Little Marvel and others) to added hydrogen ions (H+) and auxin (indole-3-acetic acid) was investigated using a modified transducer 'fast growth' measurement technique. Measurements were performed on columns of 5, 10 millimeter segments excised from the first internode of etiolated pea seedlings peeled or abraded to remove the cuticle and/or epidermis. Segments of etiolated pea respond rapidly to exogenously added hydrogen ions within the pH range 3.0 to 5.0, with a duration of 40-180 minutes. After exposure to lowered pH, segments become acid-unresponsive but retain their ability to respond to auxin. Simultaneous addition of auxin and acid, to acid-unresponsive segments, results in an instantaneous growth promotion. Also, regeneration of ability to respond to lowered pH by acid-unresponsive segments can be brought about by additions of auxin. The ability of segments to respond to hydrogen ions is closely linked with the presence of auxin. This relationship will be discussed.

2:50 THE ACID RESPONSE OF PEA STEM SEGMENTS II. THE DEVELOPMENT OF ACID-UNRESPONSIVENESS IN LIGHT TREATED PEA EPICOTYL. Grant M. Barkley and Marsha A. Forrest, Department of Biological Sciences, Kent State University, 4314 Mahoning Avenue, N.W., Warren, Ohio 44483

The response of excised segments of pea (Pisum sativum var. Alaska) to added hydrogen ions decreases with the exposure of seedlings to light. This decline in responsiveness is paralleled by greening of tissue and other light induced phenomenon. Seedlings after 8 hours of red-light (650 nanometers) or 20 hours of white-light becomes acid-unresponsive. Tissue peeling or abrading to remove cuticle and/or epidermis has no effect on unresponsive nature of segments. As with acid-unresponsive etiolated tissue, light treated tissue retains the ability to respond to added auxin and simultaneous addition of auxin and lowered pH results in instantaneous growth promotion. The latent time of response initiation when both lowered pH and auxin are given is a function of the pH decrease. The relationship between auxin and lowered pH in green tissue is apparently similar to that found for acid-unresponsive etiolated tissue.

3:00 CYANIDE INHIBITION OF AVENA COLEOPTILE ELONGATION INDUCED BY STRONGLY BUFFERED ACID. Morris G. Cline & Esther S. Chia Department of Botany, Ohio State University, Columbus, OH 43210.

Acid-induced wall-loosening in elongating plant tissue has been thought to occur independently of respratory metabolism. However, recent studies from our laboratory have shown 1 mM KCN to inhibit acid (5 mM succinate, pH 3, 4, and 5)-induced elongation of peeled Avena coleoptile segments, thus suggesting at least some metabolic dependence for wall extensibility. It has been pointed out that the buffer strength (5 mM) of the succinic acid used in our experiments may not be strong enough to maintain an appropriate concentration of hydrogen ions in the cell wall region of the tissue. Therefore, the effects of 1 mM KCN on acid-induced growth at pH 3.5, 4, and 5 with 20 mM succinate buffer have been examined. The results indicate that KCN still inhibits acid-induced elongation although the possibility of the existance of KCN side effects has not been ruled out.

PHOTOSYNTHESIS IN SUBMERGED AQUATIC PLANTS UNDER DISCONTINUOUS LIGHTING
3:15 Atwell M. Wallace, Ohio University-Chillicothe, Chillicothe, Ohio 45601

Following Blackman's 1905 principle of light and dark reactions in photosynthesis, a high intensity strobotic type 1531 with a xenon tube and a range of 100 to 25,000 flashes per minute was used as the light source for inducing photosynthesis in various aquatic plants. The rate was determined by adding carbon 14 potassium bicarbonate to 50 ml distilled water in 250 ml beakers containing comparable specimens (Wallace 1969) and after exposures of one hour checking the dried specimens with a Geiger counter. Exposure to full sunlight was employed as a reference.

Data were obtained for full sunlight, dark, and the following flashes per minute: 100, 500, 1000, 2000, 4000, and 6000. The dark as a control averaged about 25 cpm as background and absorption of carbon 14. At 100 flashes, count was 200, at 500 flashes count was 350, at 1000 flashes count was 500, at 2000 flashes count was 750, at 4000 flashes count was 700, at 6000 flashes count was 650 and full sunlight gave a count of 725.

It is of interest that the rate of photosynthesis approaches saturation after 2000 flashes per minute, or 34 flashes per second. This is about twice the speed of the movie camera which appears continuous to our eyes. Some reduction in rate was noted at high flash rates.

Calculations indicate discontinuous illumination may increase efficiency of light energy supplied by thousands of times.

MOTILE CELL ULTRASTRUCTURE OF ULVARIA OXYSPERMA (CHLOROPHYTA, ULVALES) AND ITS PHYLOGENETIC SIGNIFICANCE. H. J. Hoops and G. L. Floyd. Botany Department, The
3:25 Ohio State University, Columbus, Ohio, 43210.

The biflagellate motile cell of Ulvaria oxysperma has a cruciate microtubular-rootlet system consisting of 3-over-1 and 2-membered rootlets. The rootlets insert above the basal bodies and below a structure similar in appearance to the mating structure of Chlamydomonas gametes. The 3-over-1 rootlets have an associated amorphous material, at least in the anterior region of the cell. One of the 3-over-1 rootlets extends to very near the eyespot in the chloroplast. Each 2-membered rootlet is associated with a finely striated component. In addition a rhizoplast extends posteriorly from each basal body and attaches at the cell perimeter. The basal bodies are connected to one another and to the rootlet system by a distal and two proximal fibers. The ultrastructure of the anterior end of the swarmer of Ulvaria oxysperma shows this member of the Ulvaphyceae to be very similar to the motile cells of the Chlorophyceae.

ULTRASTRUCTURAL CHANGES DURING THE EARLY STAGES OF POLLEN EMBRYOGENESIS IN CULTURED ANTHERS OF HYOSCYAMUS NIGER. T. L. Reynolds, Botany Department, The Ohio State
3:40 University, Columbus, Ohio 43210, J. H. Dodds, Botany Department, University College Wales, Aberystwyth, U.K., and V. Raghavan, Botany Department, The Ohio State University, Columbus, Ohio 43210.

Light microscopic studies of pollen embryogenesis in anther cultures of Hyoscyamus niger have shown that during the first few days of culture, a small percentage of pollen grains initiate cell divisions that eventually lead to the formation of haploid embryoids and plantlets. Although this phenomenon occurs readily in many plants belonging to the Solanaceae, H. niger is unusual in that it appears to be the only system studied thus far, in which embryogenesis is not preceded by a long induction phase of normal gametophytic differentiation. The purpose of this investigation has been to describe the ultrastructural changes associated with the reprogramming of pollen grains, in cultured anthers, into the embryogenic pathway and to identify the stages at which specific changes associated with the induction process occur. Scanning electron microscopic observations were also made to link available light microscopic information to TEM data.

USE OF LIGHT-EMITTING DIODES FOR PHOTOMORPHOGENIC IRRADIATION OF SEEDS AND SMALL PLANTS. Clark S. Huckaby and Robert S. Platt Jr. Department of Botany, The Ohio State University, Columbus, Ohio 43210.

3:55

Compared to the light requirements of photosynthetic studies, phytochrome-mediated and other photomorphogenic reactions usually require relatively specific wavelength bands, especially with a distinction between red and far red. Light-emitting diodes (LEDs), so common now in electronic displays, turn out to be peculiarly suited to the study of light reactions in small plant systems such as spores, small seeds, mosses and fern gametophytes. Although theoretically similar to a laser, an LED emits incoherent radiation over a broader band of wavelengths. One gallium arsenide phosphide LED with a peak at 670 nm has a half-peak width of 35 nm. No blocking filter is necessary to use this as a red source for phytochrome irradiation. Other LEDs radiate primarily in the far red and infra red, as for example one of gallium phosphide that peaks at 720 nm with a half-peak width of 100 nm. In spite of the width of this band, it is predominantly far red, and unlike incandescent sources, virtually free of thermal radiation. For phytochrome studies, the red component of this LED can be excluded with one of the common blue filters that has an abrupt decrease in absorption at 700 nm. Most LEDs only begin radiating at a bias voltage of about $1\frac{1}{2}$ v. Two battery cells in series (3 v) give an intensity adequate, for example, for spore germination, and at this potential a typical small LED draws not much more than 10 Ma.

INDUCTION OF GERMINATION IN SPORES OF THE FERN, THELYPTERIS KUNTHII. Clark S. Huckaby and V. Raghavan. Department of Botany, The Ohio State University, Columbus, Ohio 43210.

4:10

In fully imbibed spores of the fern Thelypteris kunthii (Desv.) Morton, germination, as evidenced by the opening of the exine and appearance of the rhizoid initial, occurs about 48 h after exposure to a light stimulus. Maximum germination is obtained using saturating doses of fluorescent white light, broad-band red light, and narrow-band red light provided by light-emitting diodes. Prolonged exposure to far-red light results in low germination and abnormal development of the gametophyte. Broad-band blue light inhibits germination and reduces the sensitivity of the spores to subsequent inductive light treatments. Potentiation of spore germination by red light is inhibited by brief exposure to far-red light, suggesting phytochrome involvement in the photoinductive process. Spores of T. kunthii are surrounded by a dark sculptured perine which affects the quality and quantity of the light impinging on the intracellular photoreceptive sites; the possible adaptive significance of the perine in germination will be discussed.

C. GEOLOGY

FIRST MORNING SESSION

ENGINEERING-SCIENCE 3000

EDWIN T. ASHWORTH, PRESIDING

PRELIMINARY INVESTIGATION OF SOME PROPERTIES OF A POZZOLANIC ADMIXTURE TO DETERMINE ITS SUITABILITY AS A SANITARY LANDFILL LINER. David R. Buss, Dept. of Geosciences, The Pennsylvania State University, University Park, PA 16802, William A. Kneller, and Lon C. Ruedisili, Dept. of Geology, The University of Toledo, Toledo, Ohio 43606.

9:00

Pozzolanic admixtures composed of fine-grained carbonate aggregate, fly ash. and lime were subjected to a series of five test procedures to evaluate potential as a sanitary landfill liner. Fine-grained carbonate aggregate sampled were selected from six quarries in northwestern Ohio for utilization in the admixtures.

These admixtures exhibited compressive strength values ranging from 402 to 1,112 pounds per square inch. Hydraulic conductivity, values measured by a falling head permeameter utilizing heat-shrinkable tubing, ranged between 10^{-8} and 10^{-6} centimeters per second. Studies of the pore system indicate polymodal pore size distributions, high effective porosity, and large specific surface area. Preliminary contaminate attenuation studies suggest that chemical precipitation of insoluble metal hydroxides is the principal mechanism for pollutant containment. The pozzolanic admixtures are cost competitive with other lining media; between $2.22 to $2.77 per square yard installed. Statistical comparisons indicate that the properties of the fine-grained aggregate exert a controlling influence upon the performance of each admixture. Further studies of contaminate attenuation and emplacement design are necessary for a complete assessment of the potential of this material. This study indicates that pozzolanic materials show a promising potential as a landfill lining media.

THE KARST LANDSCAPES OF THE BELLEVUE-CASTALIA REGION
John J. Tintera and Jane L. Forsyth, Geology Department, Bowling Green State University, Bowling Green, Ohio 43403

9:15

Bellevue and Castalia lie along the NE-SW-oriented cuesta of the Devonian Columbus Limestone, which here, on the E flank of the Cincinnati (Findlay) Arch, dips very gently to the east. This limestone is resistant enough to create a significant ridge and pure enough to have numerous solution features, features studied in a thesis by the senior author in 1979.

All solution features observed occurred at the surface; no caverns or dripstone deposits are known, though they may be present out of sight at depth. Certainly most natural drainage is underground, feeding the famous Blues of the Castalia area. The main solution features observed were sinkholes, though not all contained bedrock or swallowholes. Most (over 200) were small, 10-100 feet in diameter. About 40 were larger, with diameters of 150 to several thousand feet; some had several swallowholes and appeared to be compound. Joints widened by solution were observed in sinkholes, in nearby quarries, and elsewhere. Orientations of these joints were mostly NE-SW, but to the west, on the cuesta, orientations were mainly toward the NW, both directions being generally repeated in the orientations of sinkhole axes and alignments. Apparently the regional (subsurface) drainage is eastward off the cuesta, diverted NE by the NE slope of the land toward Sandusky Bay. Only at the crest of the cuesta, where the land slopes fairly steeply to the NW, do NW orientations occur, apparently in response to the NW slope there.

DESCRIPTION AND INTERPRETATION OF A NEWLY EXPOSED CONTINUOUS SECTION OF THE LOGAN FORMATION (LOWER MISSISSIPPIAN) AT LOGAN, OHIO. R. J. Malcuit and K. B. Bork, Dept. of Geol. and Geog., Denison Univ., Granville, Ohio 43023

9:30

A new exposure of about 40 meters of continuous vertical section of the Logan Formation, near the type locality, was measured and described in the summer of 1977. This exposure is particularly important as a supplement to the exposure along Scott Creek because the type section is partially overgrown. This new outcrop is located on the Logan Quadrangle under a powerline near the center of Section 10 near the west end of the city of Logan. Exposed at the base of the section is about 3 meters of pebbly sandstone of the Cuyahoga Formation. The members of the Logan Formation are, from bottom to top: the Berne Conglomerate, the Byer Sandstone, the Allensville Member, and the Vinton Member. Trace fossils and marine fossils have been found in all members of the Logan at this location except in the Berne. The Berne Member (1 meter thick) is characterized by a combination of thin clay layers, pebble zones, and medium to coarse-grained sandstone units. The Byer Sandstone (7 meters thick) consists mainly of very fine to fine-grained sandstone. The Allensville Member (8 meters thick) is composed of clay layers, fine to very coarse-grained sandstone layers, and occasional small pebble conglomerate layers. The Vinton Member (21 meters exposed) is composed of alternating beds of shale, silty shale, and very fine to fine-grained sandstone. These rock units are interpreted to record progradational and transgressional events that affected the central Ohio region in Early Mississippian time.

CAVES IN BURROUGHS GLACIER REMNANT, ALASKA. G. D. McKenzie, and R.G. Goodwin, Geology and Mineralogy, Ohio State University, Columbus, Ohio 43210

9:45

Summer and winter observations on several glacier caves beneath this stagnant ice mass, which is downwasting here at about 8 m a^{-1}, indicate formation by ablation. In the summer, heat from inflowing streams, as warm as 17.5°C, and circulating warm air produce a scalloped surface on ceilings and walls. Detailed observations were made on one cave over 200 m long, with widths up to 14 m and a maximum height of 5 m near the entrance. During the winter this cave and smaller ones remain open allowing cold air to penetrate. Scalloped surfaces persist throughout the winter and mass wasting due to sublimation continues, mainly in the lower portions of cave walls. In the middle part of the cave, sublimation crystals up to 4 cm in length cover the ceiling in winter. The crystals are derived from flowstone on the cave floor and from the lower wall.

Other speleothems include stalactites, stalagmites, draperies, and rimstone. Stalagmites are few; stalactites often rim closed or incipient moulins. Depressed areas of this stagnant glacier suggest the presence of caves, the entrances of which are usually associated with inflowing streams and sometimes a horseshoe crevasse pattern. Cave entrances migrate downslope in the direction of streamflow. As new cave passages are opened by ablation, the entrance of the cave retreats downslope with the ice margin. Caves of this type might play a major roll in the wasting of stagnant ice masses.

ORIGIN AND MODULATION OF EPISODES OF CONTINENTAL GLACIATION
James Harrell, Dept. of Geology, Univ. of Toledo, Toledo, Ohio 43606

10:00

Episodes of continental glaciation are a geologic rarity. Only three well-documented examples are known from the rock record. These occurred during the Pleistocene, the Late Pennsylvanian-Early Permian, and the Late Precambrian. Two questions arise. What initiated the glaciation? And once initiated, what modulated the ebb and flow of the ice-sheets? Large-scale mountain building coupled with continentality of the polar regions seems to be a necessary prerequisite for continental glaciation. This suggests that the Quaternary glaciation is not over but rather has just begun. By studying the sedimentologic records of Pleistocene deep-sea cores it has been determined that long term terrestial climatic cycles and, hence, the timing of glacial advances and retreats is largely controlled by periodic changes in the earth's orbital parameters: the precession and obliquity of the earth's rotational axis with, respectively, 23,000 and 41,000 year cyclical changes (Hays, Imbrie and Shackleton, 1976, Science, no. 4270); and the eccentricity of the earth's orbit with 96,000 and 412,000 year cyclical changes (Briskin and Harrell, in press, Marine Geology). Demonstration of the correspondence between glacial climate and eccentricity was made possible by the development of a new method of time-series analysis: Periodic Regression with Cyclic Descent. Astronomically induced cyclical changes in the world climate have occurred throughout geologic time and not just during the glacial episodes. Thus much of the cyclical sedimentation evident in the rock record may be related to astronomical factors.

10:30
Business
Meeting

C. GEOLOGY

SECOND MORNING SESSION

ENGINEERING-SCIENCE 3003
MARK J. CAMP, PRESIDING

MINERAL ANALOGS OF PROPOSED SUPERCALCINE WASTE FORMS.
Phillips, M. W., Kwo-Ling Chyi and J. W. Shade, Department of Geology,
9:00 University of Toledo, Toledo, Ohio. 43606

Many of the supercalcine phases proposed by McCarthy (1977) as potential waste forms for the containment of high level nuclear waste ions have naturally occurring mineral analogs. These minerals may serve to model the behavior of the respective waste forms in various geologic environments as a function of time.

One important criterion to gauge the durability of a mineral (or waste form) is its ability to persist indefinitely in geological environments outside its thermodynamic stability field. In order to examine the metastable persistence of U, Th and rare earth element minerals a Relative Metastability Index (RMI) has been defined based on the number of literature citations of primary and detrital occurrances for selected mineral analogs.

RMI values indicate that the phosphate monazite phase proposed by McCarthy (1977) should serve as a durable host for the cerium earth elements La, Nd, Sm, Eu and Pm and perhaps for the actinides Am and Cm as well. This study also indicates that the mineral xenotime, though not reported as a supercalcine phase, should prove to be a durable host for the smaller yttrium earth elements. This study was supported by a contract from the U.S.N.R.C.

ECHINODERMS FROM THE BULL FORK FORMATION (UPPER ORDOVICIAN) AT CAESAR CREEK LAKE, OHIO. William I. Ausich and Gregory A. Schumacher, Department of Geology,
Wright State University, Dayton, Ohio 45435.

9:15

Seven echinoderm genera of the classes Crinoidea and Stelleroidea have been collected from extensive exposures of the Bull Fork Formation at Caesar Creek Lake Emergency Spillway, Warren County, Ohio. Seventy-five feet (27.3 meters) of the Bull Fork Formation are exposed at this section with the Waynesville-Bull Fork formational contact at the floor of the southern end of the spillway. Crinoids are found throughout the section. Rhaphanocrinus (?) Wachsmuth and Springer was collected from float approximately 45 feet (16.4 m) above the base of the Bull Fork, and Cupulocrinus d'Orbigny and Cincinnaticrinus Warn and Strimple were collected in the lower 20 feet (7.3 m). Lichenocrinus Hall occurs throughout this Bull Fork section. Remains of the following two stelleroids are present: Petraster (?) Billings from the lower 30 feet and Promopalaeaster Schuchert from the lower 20 feet of the Bull Fork. Dendrocrinus and Petraster (?) occur together, as do Cupulocrinus and Cincinnaticrinus. Lichenocrinus specimens are encrusted onto either the exterior or interior of the following brachiopod valves: Rafinesquina Hall and Clarke, Lepidocyclus Wang, Plaesiomys Hall and Clarke, Strophomena Rafinesque, and Thaerodonta Wang.

9:30 LATE-WISCONSINAN DEGLACIATION OF SOUTH-CENTRAL COASTAL MAINE. Kim S. Stemen, Geology and Mineralogy, Ohio State University, Columbus, Ohio 43210

The final retreat of the Laurentide Ice Sheet from south-central coastal Maine occurred contemporaneously with marine inundation. Synchronous removal of glacial ice and marine submergence of the coastal zone is evidenced by depositional intermixing and stratigraphic interrelationships of glacial and glaciomarine sediments. Vertical and horizontal facies can be recognized within morainal deposits formed during glacial stillstand. These sequences indicate that sedimentation was continuous during deglaciation.

Late-Wisconsinan strata of the area consist of four glacial units deposited upon previously glaciated bedrock. These units include: 1) coarse, well-sorted, and well-rounded ice-contact sediments, 2) dense, compact till with a large fraction of silt and clay, 3) relatively thick sequences of well-bedded, seaward dipping deltaic sand, and 4) fossiliferous silt and clay of the marine Presumpscot Formation. Stratigraphic relationships of these units are observable in numerous quarries and excavation sites throughout the region. Deformational features that truncate or otherwise interrupt the gradational depositional relationships of the sediments are commonly displayed within these exposures. By examining the stratagraphic and deformational relationships present within the coastal sediments, many attributes of the character of the late-Wisconsinan deglaciation can be determined.

9:45 THE AMAZONITES OF CRYSTAL PEAK AREA, COLORADO by Ann G. Harris & Edward Mooney, Dept. of Geology, Youngstown State University, 410 Wick Ave., Youngstown, Ohio 44555.

Crystal Peak is located in Teller County, about two miles north of Florissant, Colorado. The peak is composed of a coarse-grained Precambrian granite called The Pikes Peak Granite. This granite which is part of the Pikes Peak batholith contains pegmatite veins and vugs. In these vugs are smoky and rock crystal quartz, feldspar crystals (including the amazonite variety of micrcline), amethyst, goethite, limonite, fluorite, topas and others. Most of the amazonite crystals are 1 to 3 inches long and many of them possess an albite cap on part of the termination and an albite coating on one or more of the crystal faces.

The feldspars were subjected to three methods of trace element analysis. These methods were neutron activation analysis, emission spectroscopy and electron microprobe analysis. Petrographic analysis, x-ray diffraction and Differential Thermal Analysis (DTA) was also run.

The conclusion reached was that lead is the impurity giving rise to the color of the Crystal Peak amazonites. Pb^{+2} substituting for $2K^{+}$ in the amazonite structure produces a blue-green color center.

10:00 THE PRESERVATION OF MAMMOTH CARCASSES. R. Thomas Myers, Dept. of Chemistry, Kent State University, Kent, Ohio 44242

In order to be preserved for very long periods of time an animal carcass must be protected from: micropredators (mold, bacteria, maggots), macropredators (carnivores, humans), and elemental oxygen, even the oxygen dissolved in groundwater. Mere freezing to death on the surface will not furnish this protection. Standard secondary sources, such as "Legends of the Earth: Their Geologic Origins", by Vitaliano suggest that mammoth carcasses were quick-frozen near the end of an interglacial. This is not true.

The best documented example, the Berezovka mammoth, died of suffocation in the summer or fall when all of the above destructive agents are present. Evidence indicates that the wounded animal sank, while alive, into a boggy swamp and died of suffocation. This environment protected the carcass from all decomposing agents. The well-preserved bodies of the Bog People demonstrate that conditions in a bog can preserve tissue virtually intact for a thousand years, time for an ice age to ensue. Later movement of the body must have been followed by quick freezing, so that it was protected from oxygen in groundwater by permafrost.

10:30 Business Meeting

C. GEOLOGY

FIRST AFTERNOON SESSION

ENGINEERING-SCIENCE 3000
EDWIN T. ASHWORTH, PRESIDING

1:30 LATE PLEISTOCENE MOLLUSCAN FAUNA OF THE MAUMEE VALLEY, LUCAS AND WOOD COUNTIES, OHIO. Mark J. Camp, Dept. of Geology, The University of Toledo, Toledo, Ohio 43606.

A three meter section of fluvial sediments 0.4 kilometers west of Fort Meigs, Wood County, Ohio on the Maumee River floodplain was sampled stratigraphically to determine changes in molluscan abundance with floodplain succession. Additional qualitative data of molluscan diversity were obtained from the study of sieve fractions from several anthropologic sites in the area.

The ctenobranchs, Campeloma decisum, Goniobasis livescens, and Pleurocera acutum; the sphaeriid, Sphaerium sulcatum; and the unionids, Amblema costata, Cyclonaias tuberculata, Elliptio complanatus, and Lampsilis radiata siliquoidea are considered significant indigenous species during the early stage of the Maumee River. Several other species of sphaeriids occur, but not in significant numbers. The aquatic pulmonates, Fossaria sp., Helisoma anceps, and H. campanulatum probably inhabited shallow protected pools behind sand bars or in depressions on the floodplain.

Terrestrial pulmonates occur near the top of the Fort Meigs section and in most of the anthropologic samples. Allogona profunda, Anguispira alternata, Mesodon clausus, Stenotrema fraternum, and Triodopsis albolabris are significant in the sieved samples while succineids and and pupillids are common in the Ft. Meigs section.

1:45 THE WELL DRAINED SOILS OF ARCTIC ALASKA: A TAXONOMIC CHALLENGE. Daniel Crowner, Department of Agronomy, The Ohio State University, 1885 Neil Ave. Mall, Columbus, Ohio, 43210

Well drained soils occupy a relatively small proportion of the landscape of Alaska's north slope, but deserve close consideration because of their uniqueness. They occur on sand dunes on the northern coastal plain, dry ridge tops in the foothills north of the Brooks Range and on alluvial fans and kames in the mountain valleys. A 960 km west to east transect from Cape Thompson on the western arctic coast to the Trans-Alaskan Pipeline and a 560 km transect south from Prudhoe Bay to the Yukon River was made to determine regional and general trends in development and classification of the well drained soils. In the 1938 classification system the soils were designated Tundra soils. Since Tedrow and Hill's work in 1955 they have been called Arctic Brown soils. Some researchers have speculated that Arctic Brown soils represent a stage in evolution toward Spodosols (USDA classification) or Podzols (Canadian classification).

It is likely that many of the soils on stable surfaces, some exceeding 1×10^5 years, have or are approaching their potential for maximum horizon expression. Laboratory analysis, however, showed that the soils do not meet the chemical criteria for Spodosols or Podzols. Soils of the old, stable, loamy surfaces are most appropriately called Inceptisols (USDA classification). Those soils on sandy or young surfaces are Entisols.

2:00 HYDROTHERMAL STABILITY OF SUPERCALCINE CERAMICS
Chyi, Kwo-Ling, J. W. Shade and M. W. Phillips, Department of Geology, and The Eitel Institute for Silicate Research, University of Toledo, Toledo, Ohio 43606.

McCarthy (1977) has proposed a number of crystalline "supercalcine" ceramic phases as potential waste forms for the containment of high level nuclear waste ions. In order to gauge the durability of these phases it is important to understand how they interact with potential geologic repository media under hydrothermal environments.

Supercalcines have been prepared by adding 19.1% SiO_2, 4.9% CaO, 4.4% Al_2O_3 and 1.2% SrO to simulated purex process waste streams (PW-7a-2 and PW-8a-5; Ross et al. (1978) and firing in air at 1100°C for several hours.

Hydrothermal runs of three weeks duration have been performed on these supercalcines in the presence of Columbia River basalt using a double capsule technique. Experiments were performed at 300°, 400° and 500°C and 1000 bars using distilled water and 0.1M, 0.5M and 1.0M solutions of NaCl.

Results of this study indicate that percent weight loss of the supercalcine increases with increasing temperature but decreases with increasing NaCl molarity. As expected, the percent weight loss is increased by increasing the solution to solid ratio.

PETROGRAPHY AND DIAGENETIC EVOLUTION OF CEMENTS IN SOME PLEISTOCENE GLACIOFLUVIAL DEPOSITS FROM S.W. OHIO, S.E. INDIANA, AND N. KENTUCKY S.T. Paxton and W.D. Martin, Dept. of Geology, Miami University, Oxford, OH 45056

2:20

Glaciofluvial sands and gravels deposited during the Wisconsinan, Illinoian, and pre-Illinoian (Kansan?) glacial advances are commonly cemented by calcite. The rocks contain two cements that are texturally distinct. One appears to be a micrite which contains variable amounts of clay. This cement is interpreted to be a lithified glacial flour. The other form of cement is sparry calcite. Some spar cement and all argillaceous micrite cement display a discontinuous rim and/or a meniscus that coats the pore walls and indicates deposition in the vadose zone. Continuous rim cement of euhedral sparry calcite suggests precipitation in partially to completely water-filled pores. Crystal growth in water-filled pores may have occurred in the phreatic zone. Relationships between cements and framework components indicate sediment composition and texture influence style and degree of cementation. Grain size and volume percent rock fragments decrease together, while volume percent siliciclastic grains increases. This complex behavior is a manifestation of selective sorting by size, shape, and density. As degree of sorting improves, the amount of cement, particularly spar, increases. The system $CaCO_3$-CO_2-H_2O was evaluated in terms of water temperatures and partial CO_2 pressures characteristic of the subaerial freshwater diagenetic environment. The chemical relationships suggest the probability of cementation would be highest in a temperate glacial setting, specifically during the summer months.

MORPHOMETRIC ANALYSIS OF BEDROCK-CONTROLLED DRAINAGE BASINS IN GLACIATED TERRAIN OF NORTHEASTERN OHIO. John D. Thompson and John P. Szabo, Department of Geology, University of Akron, Akron, Ohio 44325.

2:40

Morphometric analysis of ten small drainage basins in northern Summit and Portage Counties, Ohio, showed definite orientations in most of the stream segments. Analysis of jointing attitudes in the underlying Sharon Conglomerate showed some tendency of the streams to follow these trends, even in areas where the glacial overburden was thick. Study of bedrock contour maps revealed a paleotopography very similar to the present topography for the 14.98 mi^2 (38.83 km^2) of basins evaluated. Streams in the analysed basins followed the slope of the bedrock topography without exception. Also, nine of the ten basins had their outlets into streams which drained through or parallel to end moraines. These streams had a strong tendency to follow the larger paleovalleys.

MINERALOGY OF WISCONSINAN TILLS IN NORTHERN SUMMIT COUNTY, OHIO. Dale E. Ryan and John P. Szabo, Department of Geology, University of Akron, Akron, Ohio 44325.

3:00

Wisconsinan tills in northern Summit County may be separated on the basis of their mineralogy. Quartz, alkali feldspar, and plagioclase contents of the fine sand fraction of the tills were determined using cathodoluminescence. Carbonate content of the less than 74 micron fraction was determined using a Chittick apparatus. The Early Wisconsinan Titusville Till (Mogadore Till) had a high quartz/feldspar ratio. Plagioclase was the dominant feldspar, and dolomite was the dominant carbonate mineral. The Late Wisconsinan Lavery Till and an underlying unnamed till had low quartz/feldspar ratios. Alkali feldspar dominated, and generally the tills contained about equal amounts of dolomite and calcite. The mineralogy of these tills reflect a variation in source area of the sublobes which glaciated northern Summit County.

CERAMIC CLAY SIMULATION OF THIN-SKINNED FOLDING
Kulander, Byron R., Department of Geology, Wright State University, Dayton, Ohio 45435; Dean, Stuart L., Department of Geology, University of Toledo, Toledo, Ohio 43606.

3:20

Combined lateral compression and gravity spreading were effected on layered ceramic clays scaled down through different viscosities and densities to simulate variations in a sedimentary rock column which could permit buckle folding, passive folding and thrust faulting. The models show that major fold growth proceeds from the uplifted core area towards the craton and involves different décollement horizons. The models also demonstrate the limitations to transposition above shallow décollement levels where upward longitudinal ramping has occurred from a lower décollement level. In addition, the models illustrate that apparently offset fold structures across transverse lineament zones may be an illusion caused primarily by the plunge-out of individual folds developed above shallow décollements. No wrench faulting is required. Similarly, changes in fold wave length, structural trend and amplitude may be caused strictly by variations in the amount of hingeward flow of low density material and by variations in the attitude of longitudinal step thrusts and major longitudinal ramps. The models also show that early formed thrust faults appear as normal faults on the rotated and over steepened limbs of folds.

INTERPRETATION OF ROCK FRACTURE HISTORY IN LAYERED ROCKS THROUGH USE OF PLUMOSE STRUCTURES

3:40 Dean, Stuart L., Department of Geology, University of Toledo, 43606
Kulander, Byron R., Department of Geology, Wright State University, Dayton, Ohio 45435

A variety of features form associated with joint development and constitute what is commonly called plumose structure. The features can be used to determine the fracture origin point, sequence of fracture development, various positions of the fracture front, relative variations in fracture propagation velocity, and changes in orientation of the principal stresses.

The following basic rules apply for plumose geometry interpretation.
1. The least principal effective stress maintains a perpendicular relationship to the fracture front. The maximum principal stress orientation lies in the plane of the fracture front and follows the path of the diverging fracture plume.
2. A direct relationship exists between the spacing of arrest lines, which represent different positions of the fracture front, and fracture propagation velocity. Arrest lines are farthest apart along the plume axis where fracture propagation is most rapid because of high values of effective tensile stress. Conversely, arrest lines converge toward layer boundaries where effective tensile stress is lowest.

EFFECT OF CHEMICAL WEATHERING ON Rb-Sr DATES OF THE PRECAMBRIAN BASEMENT, SCIOTO COUNTY, OHIO.

4:00 Gunter Faure and Frederic C. Barbis, Department of Geology and Mineralogy, The Ohio State University, Columbus, Ohio, 43210

A 37 foot core of granitic gneisses from the Precambrian basement was recovered from a well drilled in Greenup Quadrangle, Green Township, Scioto County. The rocks are composed of adularia, plagioclase, biotite, hornblende, chlorite, magnetite and accessory minerals. In the upper part of the core plagioclase is replaced by adularia whose abundance decreases from about 80% at the top to trace amounts at a depth of about 24 feet. The lower portion of the core does not contain adularia. Eight whole-rock samples from the upper part of the core yield a Rb-Sr isochron date of 700 $\pm$ 28 million years and an initial $^{87}Sr/^{86}Sr$ ratio of 0.7101 $\pm$ 0.0007. Six samples from the lower core have an age of 1163 $\pm$ 36 million years and an initial ratio of 0.7048 $\pm$ 0.0010. The difference in apparent age is attributable to the presence of adularia in the upper part of the core. One sample of adularia was dated at 450 $\pm$ 50 million years. This suggests that the adularia was formed in early Paleozoic time by a reaction between kaolinite and brines after the marine transgression of the weathered Precambrian erosion surface. Similar results have been obtained from other basement cores in Ohio.

USE OF STRONTIUM ISOTOPES TO STUDY PROVENANCE OF FELDSPARS IN TILL AT THE GAHANNA CUT, OHIO.

4:15 Karen S. Taylor and Gunter Faure, Department of Geology and Mineralogy, The Ohio State University, Columbus, Ohio, 43210.

The Gahanna Cut is a seventeen meter till exposure on Rocky Fork Creek in the city of Gahanna, Ohio. It consists of three till units and a layer of sand and gravel outwash. The feldspar, concentrated in the -60 +120 fraction of each layer is a mixture of grains derived from the Superior Province (2.69 b.y.) and the Grenville Province (1.07 b.y.) of the Precambrian Shield in Canada. These mixtures are datable by the Rb-Sr method, thus distinguishing till units of different provenances and the extent of mixing by subsequent glacial advances. Feldspar from the fine-grained outwash has an average Rb/Sr ratio of 0.286 $\pm$ 0.012 while the coarse grained outwash contact unit has a mean of 0.181 $\pm$ 0.002 and the till layer above that results in 0.198 $\pm$ .003. The $^{87}Sr/^{86}Sr$ ratios are 0.7164 $\pm$ 0.0007, 0.7151 $\pm$ 0.00007 and 0.7144 $\pm$ 0.00012, respectively. The resulting provenance dates are 1.07 b.y. for the fine outwash, 1.47 b.y. for the coarse, and 1.27 b.y. for the overlying till layer. These results confirm the feasibility of using strontium isotopes to differentiate till layers by provenance as demonstrated also in a recent study of regional provenance variations of feldspar in the Powell Moraine.

D. MEDICAL SCIENCES

MORNING SESSION

ENGINEERING-SCIENCE 1004
JOHN A. NEGULESCO, PRESIDING

AN ASSAY OF TYLOSIN TARTRATE LEVELS IN INCUBATING TURKEY EGGS FROM DAY ONE TO HATCH. Frey, R.D.; Shearer, T.S.; Reiter, C.M.; and Frey, J.R. Natural Systems Studies Department, The Defiance College, Defiance, Ohio 43512

8:30

Treatment of hatching turkey eggs by dipping in antibiotic solutions under pressure to control egg-transmitted pathogens is widely practiced. Turkey eggs used in this study were obtained from a commercial hatchery. All procedures related to the dipping process and incubation were carried out by hatchery personnel. Enough eggs were dipped on day one to assure embryonic viability throughout the 28-day incubation period to hatch. Eggs dipped in tank fluid containing tylosin tartrate were subsequently incubated. Eggs thus treated were removed from the incubator each day following day one of incubation. The fluid contents of these eggs were collected aseptically and assayed for tylosin tartrate levels. The cylinder plate method using Micrococcus luteus (ATCC #9341) was used to determine the tylosin tartrate concentrations present in the samples tested. This paper presents data showing the relationship between the levels of tylosin tartrate relevant to incubation time and embryo development.

BRAIN STEM AND SPINAL CORD NUCLEI WHICH PROJECT TO THE THALAMIC VENTRAL TIER OF SQUIRREL MONKEY (SAIMIRI SCIUREUS). David Garfunkel, John C. Pearson. Department of Anatomy, Wright State University, Dayton, Ohio 45435.

8:45

The dorsal column-medial lemniscal pathway conveys discriminative touch from the skin and proprioceptivation from rapidly adapting joint receptors; whereas spinothalamic fibers convey pain, thermal sensation and light touch. Proprioceptive input from slowly adapting stretch receptors in muscle has been considered to project only to the cerebellum via spinocerebellar pathways. Although recent studies indicate that information from muscle stretch receptors is conveyed to the forebrain via spinothalamic fibers, this system may not be the only route by which this information reaches the thalamus. Physiological studies have shown that the external cuneate nucleus (ECN), the lateral cervical nucleus (LCN), and z nucleus convey proprioceptive data from muscle stretch receptors. Anatomical studies have shown that in Old World monkeys these three nuclei project to the thalamus, whereas in cat only the LCN and z nucleus have forebrain connections. The purpose of this study is to identify nuclei of the brainstem and spinal cord which project to the thalamic ventral tier in a New World monkey. Stereotaxic injections of horseradish peroxidase were made in the ventral tier of 5 squirrel monkeys. Tissue was frozen sectioned and reacted with tetramethyl benzidine. Results indicate that in addition to projections from the dorsal column nuclei and the intermediate spinal gray, the ventral tier of this New World primate also receives fibers from the ECN, the LCN and the z nucleus.

EFFECT OF HIPPOCAMPAL LESIONS ON ARTERIAL BLOOD PRESSURE AND BODY TEMPERATURE. Richard A. Gittinger, Cyrilla H. Wideman and Helen M. Murphy. John Carroll University, Cleveland, Ohio 44118.

9:00

Systolic arterial blood pressure was measured in rats with hippocampal lesions, cortical control and normal animals. The method employed was tail plethysmography utilizing a Narco blood pressure unit connected to a Gould recorder. In order to obtain significant circulation through the caudal artery, each rat was placed in a warming box for 20 minutes before the recording was taken. Animals with hippocampal lesions had significantly lower mean blood pressure than controls ($p = 0.002$). Additional studies measured body temperature in the three groups both at room temperature and after 20 minutes in the warming box. There were no significant differences among the three groups when the body temperature was recorded at room temperature. However, after 20 minutes in the warming box, animals with hippocampal lesions had significantly lowered body temperatures than cortical control and normal animals ($p = 0.002$). The body temperature results indicate that the blood pressure recordings may have been taken under different physiological states in the animals. Possible hormonal influences and neuronal connections between the hippocampus and hypothalamus may account for the observed differences.

AN HRP STUDY OF THE SENSORY INNERVATION OF THE RAT TEMPOROMANDIBULAR JOINT.

9:15 Roger W. Pacholka, Robert M. Beecher, John C. Pearson, and Creighton Phelps. Department of Anatomy, Wright State University, Dayton, Ohio 45435.

The purpose of this study was to trace sensory projections from the temporomandibular joint (TMJ) region to the trigeminal ganglion and brainstem in the rat. Most people diagnosed as having TMJ dysfunction/myofacial pain syndrome report pain referred to the trapezius, sternocleidomastoid, frontalis, and temporalis muscles. It is hypothesized that the anatomical basis for the referred pain is the convergence of sensory input within the brainstem, thalamus, and cerebral cortex. Projections from the TMJ capsule area were traced using horseradish peroxidase (Sigma Type VI). The joint capsule was surgically exposed and the capsule was injected with a solution of HRP and dimethylsulfoxide (DMSO). The DMSO was utilized in order to enhance the permeability of the joint tissues and increase the probability of HRP uptake by axon terminals, especially those deep within the joint capsule. The enzyme reaction product was visualized using the tetramethyl benzidine method. With this technique, axons have been traced to the area of the subnucleus caudalis of the spinal trigeminal sensory nucleus. Subnucleus caudalis is continuous caudad with substantia gelatinosa, which may contain neurons receiving sensory projections from the trapezius and sternocleidomastoid muscles.

QUALITATIVE AND QUANTITATIVE ASSESSMENT FOR A WHOLE MOUNT STAINING TECHNIQUE FOR THE STUDY OF CRANIOFACIAL SUTURAL DEVELOPMENT.

Scott Lozanoff, Department of Anatomy, The Ohio State University, College of Medicine, Columbus, OH 43210.

9:30

Inouye has developed a differential staining technique in order to demonstrate cartilaginous and osseous components of the fetal mouse skeleton (Cong. Anom. 16:171, 1976). This technique, which utilized alcian blue and alizarin red S, has thus far been used to study skeletal development only in the fetus. The present investigation was undertaken to assess the suitability of this staining technique in the study of craniofacial sutural development.

NIH Swiss mice were mated and littermates were selected at random and sacrificed on the day of birth and every fifth day thereafter until the cranial sutures were closed. Cranial measurements were made using a dial caliper. The specimens were then fixed in 95% ethanol, stained for 3-4 days at 37° C in a solution of 0.15% alcian blue 8GX, 0.005% alizarin red S and 5.0% acetic acid in 70% ethanol, and subsequently cleared in 1% KOH followed by glycerin. Cranial measurements of specimens from each group were compared. Statistical analysis of these measurements was used to estimate the age at which significant cranial width expansion ceased. An index of sutural fusion was constructed based on the estimated age of maximum cranial width. Stained gross specimens were qualitatively compared with the osteometric sutural fusion index to provide a relative measure of staining accuracy, and histological examination was employed in order to test the validity of the osteometric and gross staining techniques.

EFFECT OF PANCREATIC ASCITES FLUID ON LIVER CELL RESPIRATION,

T.N. Pappas, M.A. Lessler, E.C. Ellison and L.C. Carey, Departments of Surgery and

9:45 Physiology, Ohio State University, Columbus, Ohio 43210.

A bioassay was developed to study the effects of pancreatic ascites fluid on rat liver cell metabolism. Livers were rapidly removed from decapitated Sprague-Dawley rats and kept on ice in physiological saline solution (pH 7.2) during all preparatory procedures. The ascites fluid was collected from experimental dogs with pancreatitis induced by pancreatic duct infusion of bile salts and trypsin. The minced liver slices were weighed, placed in a known amount of physiological solution and the oxygen uptake measured with a YSI model 53 Biological Oxygen Monitor. Each liver sample was run for a control period, to establish a base line for oxidative activity, then 40 µl of pancreatic ascites fluid was introduced into the reaction chamber with continuous recording of the O_2 uptake. Mean $\pm$ SD oxygen consumption for controls was 0.63 $\pm$ 0.18 µl/hr/mg and fell to 0.49 $\pm$ 0.18 µl/hr/mg after addition of the ascites fluid. This represents a 22% reduction in liver cell activity after adding the ascites fluid. The results suggest that one or more substances toxic to liver cell metabolism exist in pancreatic ascites fluid. (Dr. E.C. Ellison provided the pancreatic ascites fluid).

A COMPARATIVE STUDY OF THE MORPHOLOGICAL DEVELOPMENT OF THE ADRENAL GLANDS IN THE FETAL RAT AND CHICK. Jon M. Sullivan and David Garvey, Department of Anatomy, Wright State University, Dayton, Ohio 45435.

10:00

The histology of developing adrenal glands in rat and chick fetuses was compared on corresponding days (17-21) of fetal life. The general structure of the adrenals in the two species was dissimilar. In the rat, the structural zonation characteristic of the mammalian adrenal became evident during the last days of gestation; distinct cortical and medullary regions could be distinguished, as could the division of the cortical cells into discrete zones. Conversely, the avian adrenal did not exhibit a characteristic zonation; the cortical and medullary cells were intermixed throughout the parenchyma of the gland. The fetal chick adrenal glands presented a somewhat glomerular arrangement of cortico-medullary cellular units. Both the fetal rat and chick adrenals showed increasing sinusoidal networks as development progressed. Hemopoietic foci were evident in the fetal rat, but not the chick, adrenals. The hemopoietic foci in the fetal rat adrenals were of the erythroid and megakaryocytic lines. The developing rat adrenal glands showed a much higher lipid content than did the chick adrenals. In both rat and chick adrenal glands, the lipid content tended to increase as fetal development progressed. In both species during the final days of gestation, histological changes indicating the transformation of the adrenal glands from embryonic primordia to functional endocrine organs were apparent. The ultrastructure of these changes will be discussed.

THE EFFECT OF SODIUM PHENOBARBITAL AND SODIUM PENTOBARBITAL ON BRAIN GLYCOGEN LEVELS IN THE CHICK EMBRYO. J.M. Delphia, Department of Anatomy, College of Medicine, The Ohio State University, Columbus, Ohio, 43210.

10:15

Barbiturates have been cited for teratogenic effects in man and laboratory animals. Both Sodium Pentobarbital and Sodium Phenobarbital have been shown to decrease fetal and neonatal growth. Acute administration of these barbiturates result in immediate, dosage-dependent myocardial and liver glycogen depletion in six to ten day chick embryos and sixteen day rat embryos. Chronic administration of Sodium Phenobarbital results in increased brain glycogen storage in neonate and immature laboratory mammals.

The present study is concerned with the effects of Sodium Phenobarbital and Sodium Pentobarbital on brain glycogen levels in the chick embryo. Fertile White Leghorn eggs were incubated in a rotary, for ced air-incubator under normal conditions of temperature and humidity. The barbiturate or Control solution was presented into the chorio-allantoic region of the egg. Dosages of each barbiturate ranged between 2.5mg and 10.0mg/egg. The barbiturate was administered in 0.2ml saline. Controls received 0.2ml saline. Time of exposure to the barbiturate ranged between 24 hours and 168 hours. Specimens were harvested by decapitation. The brain tissue was excised immediately and placed in 10% buffered formalin or quick-frozen on dry ice for quantitative glycogen analysis. Routine histological technic was employed. The KOH-Anthrone method of glycogen analysis was used. Sodium Phenobarbital increased brain glycogen levels while Sodium Pentobarbital decreased brain glycogen.

10:30
Business
Meeting

D. MEDICAL SCIENCES

FIRST AFTERNOON SESSION

MEDICAL COLLEGE OF OHIO - HEALTH EDUCATION 100
JOHN A. NEGULESCO, PRESIDING

BOTH AFTERNOON MEDICAL SCIENCE SESSIONS WILL BE HELD ON THE CAMPUS OF THE MEDICAL COLLEGE OF OHIO. A SHUTTLE BUS IS AVAILABLE. CHECK SCHEDULE AT REGISTRATION DESK.

EFFECT(S) OF PHOSPHOCREATINE ON THE ARTICULAR AND EPIPHYSEAL CARTILAGE LAYERS OF WEIGHT BEARING AVIAN BONES. K. Clark, B. Spohn and J.A. Negulesco, Anatomy Department, College of Medicine, The Ohio State University, Columbus, Ohio, 43210.

1:00

The effects of Phosphocreatine (PC) on the articular and epiphyseal cartilage layers of developing animals have not been adequately studied. White Leghorn cockerels at 2 weeks post-hatch were injected 3x/week, for 2 weeks, with 0.2 cc saline and 0.5, 1.0 and 1.5 mg PC suspended in 0.2 cc saline in the right tibio (T)-tarsometatarsal (TM) joint. Animals were sacrificed at 4 weeks post-hatch and the T-TM joint was dissected free, fixed in 10% BNF, decalcified in 3% Nitric acid, doubly embedded, sectioned at 7-9 μm, and routinely processed for histological measurements of the midsagittal height and width of the articular and cartilage layers of the distal tibia and proximal tarsometatarsal epiphyses. Except for the decreased growth in width of the articular cartilage, PC stimulated both appositional and interstitial growth of all cartilage layers of the proximal tarsometatarsal epiphyses. Growth in height of the resting and maturing cartilage layers of the distal tibial epiphyses was decreased by 0.5 and 1.0 mg Phosphocreatine while a severe depression in the appositional growth of all cartilage layers of this entity followed administration of the biological at 1.0 and 1.5 mg levels. This investigation was supported, in part, by the General Research Support Fund of The Graduate School of The Ohio State University (Project No. 221164).

SUPPRESSION OF ADRENAL CORTICAL GROWTH AND FUNCTION IN FETAL RATS EXPOSED TO DEXAMETHASONE DURING THE LAST DAYS OF GESTATION. Lori Sullivan and David Garvey, Department of Anatomy, Wright State University, Dayton, Ohio 45435.

1:15

Exposure of fetal rats to dexamethasone, a potent synthetic glucocorticoid, during the last days of gestation resulted in suppression of adrenal cortical growth and function. Twenty-one gestation day fetuses from three groups of mothers were tested: group 1 was given dexamethasone in drinking water (5 μg/ml) for the last six days of gestation (day 15-21); group 2 received the same dosage of dexamethasone in drinking water for the last three days of gestation (day 18-21); group 3 received plain tap water and served as controls. Fetal adrenal weights were 68% and 44% lower than control values for experimental groups 1 and 2, respectively. Maternal adrenal weights were similar for all groups of animals. Fetal adrenal corticosterone levels were markedly lower in both dexamethasone groups compared to controls (89% decrease for group 1, 70% decrease for group 2). The levels of cortiocosterone in maternal and fetal plasma were also significantly lower in the dexamethasone groups compared to control animals. Histologically, the dexamethasone-treated fetal adrenal glands appeared structurally immature and their cortical cells much less active than those of the control glands. These findings are consistent with the proposed mechanism of pituitary inhibition by dexamethasone.

SODIUM STIMULATION OF AMINO ACID TRANSPORT SYSTEM A AS AN OPTIONAL EFFECT. George M. Martin and Richard H. Matthews, Dept. Physiological Chemistry, 1645 Neil Ave., Columbus, Ohio 43210.

1:30

Our laboratory has previously reported that histidine transport into S37 ascites cells from a Na^+-free medium used system A, although at decreased activity, as well as system L. This differed from the findings of other workers using the Ehrlich ascites cell, who suggested that a "non-saturable uptake" could be a major factor in translocation. In the present study, we confirmed and extended our earlier finding that the Lineweaver-Burk plot for histidine uptake retained its biphasic character in the absence of Na^+. Sucrose, K^+, and choline were alternately used as Na^+ replacements. The model substrate for the A system, 2-(methylamino)-isobutyric acid, inhibited histidine, alanine, and its own transport in the absence of Na^+. Uptake of 2-(methylamino)-isobutyric acid was concentrative in 2 minutes at low concentrations (0.10 - 0.17 mM). This study confirms the ability of system A to function in transport in the absence of Na^+, although at decreased activity. A possible error in subtracting a presumed "non-saturable uptake" component has also been suggested.

LEVELS OF LIPID PEROXIDATION IN ISOLATED HEPATOCYTES INCUBATED IN THE PRESENCE OF ADRIAMYCIN OR ACETAMINOPHEN. S. J. Burns, C. A. Niffenegger and T. E. Stege, Department of Zoology, Ohio Wesleyan University, Delaware, Ohio, 43015

1:45

Adriamycin (doxorubicin) is a chemotherapeutic agent which is active against a wide range of neoplasms. However, adriamycin has been shown to induce cardiotoxicity, which severely limits its clinical usefulness. Acetaminophen (paracetamol), a widely-used analgesic and antipyretic, in large doses has induced hepatic necrosis. Researchers have proposed that both adriamycin and acetaminophen induce cell injury via the process of lipid peroxidation. Recently idolated liver cells have been demonstrated to be an effective tool with which to study drug-induced lipid peroxidation. Therefore, adriamycin (1μM) and acetaminophen (10mM) were incubated in the presence of functionally intact isolated rat hepatocytes. Following sixty-minutes incubation, lipid peroxidation was assessed by measuring levels of malonaldehyde, a major by-product of the peroxidation process. However, levels of malonaldehyde in liver cells incubated with either adriamycin or acetaminophen did not vary significantly from controls. (Research supported in part by USPHS Grant AA03132. Adriamycin was a gift from ADRIA Labs, Columbus, Ohio.)

CYCLIC NUCLEOTIDE LEVELS IN CHINESE HAMSTER CELLS EXPOSED TO METHYLATED PURINES IN VITRO

Joel L. Flora, Richard H. Matthews, and Ronald W. Trewyn.
The Ohio State Univ., Dept. Physiological Chemistry, Columbus, OH 43210.

2:00

Earlier studies have shown that methylated purines derived from the catabolism of tRNA, specifically 1-methylguanine and 7-methylguanine, cause transformation in vitro of Chinese hamster embryo cells. In addition, other studies have demonstrated a progression of cyclic nucleotide levels in different stages of human breast diseases in vivo. Four Chinese hamster embryo cell lines: A,B,C, and D, were continuously exposed to 10 μM concentrations of 1-methylguanine (A and B), 7-methylxanthine (a caffeine degradation product, C), and caffeine (1,3,7-trimethylxanthine, D); exposure was initiated at the second passage. Continuous transformed cell lines resulted. Cyclic nucleotide levels were measured by radioimmunoassay. At passage 79, A cells (known to be tumorigenic) contained 7.7 pmoles of cAMP per mg of protein. At passage 16, B,C, and D cells contained 2.0, 0.9, and 5.3 pmoles of cAMP per mg of protein, respectively. Moreover, at passage 16 the methylated purines were removed from the media of cell culture lines C and D. At passage 19, C cells contained 1.6 pmoles of cAMP per mg of protein and at passage 20, this ratio was 5.9 for D cells. These results support the hypothesis that cyclic nucleotides may be involved in the mechanism by which tRNA catabolites and other methylated purines effect cell transformations.

CHOLINESTERASE ACTIVITY AND 2-CHLOROPROCAINE METABOLISM IN MATERNAL AND FETAL PLASMA

Kuhnert, B.R., Kuhnert, P.M., Prochaska, A.L. Perinatal Clinical Research Center, Case Western Reserve University., 3395 Scranton Rd., Cleveland, Ohio, 44109.

2:15

Plasma cholinesterase activity is low in pregnant women and in neonates. However, while ester-linked local anesthetics such as 2-chloroprocaine (2CP) are often used during labor and delivery, the ability of maternal and fetal plasma cholinesterases to metabolize these drugs has not been studied. The purpose of this study was to evaluate the cholinesterase activity following epidural anesthesia with 2CP. The study population included 33 normal patients who delivered vaginally or by repeat Cesarean section, and their infants. Gas chromatographic techniques were used to determine 2CP and its metabolite - 2, chloroaminobenzoic acid - in maternal and fetal plasma; spectrophotometric techniques to determine enzyme activity. The results indicate the following: Plasma cholinesterase activity was low in both pregnant patients and neonates and further decreased following anesthesia in both groups. In maternal plasma, cholinesterase activity prior to anesthesia was 42 % less per ml plasma when compared to nonpregnant controls. Following anesthesia, enzyme activity was 80 % less than that measured prior to anesthesia. In cord blood plasma, cholinesterase activity was 22 % lower than that found in nonpregnant women, and 70% lower in infants whose mothers received 2 CP than in control infants. Since 2CP was detectable in both maternal and fetal plasma, these data suggest that the decreased activity of maternal and fetal cholinesterases at term are adequate to hydrolyze most, but not all of the plasma 2CP following epidural anesthesia.

SMALL INTESTINAL AND HEPATIC ARTERIAL VASCULAR RESPONSES TO OXYTOCIN IN THE CANINE. Mary A. Desiderio and Kenneth M. Hanson. Department of Physiology, The Ohio State University, College of Medicine, 333 West 10th Avenue, Columbus, Ohio 43210.

2:30

Cardiovascular effects of i.v. infusion of oxytocin in pharmacologic doses was studied in anesthetized male dogs. Doses ranged from 0.95 to 7.6 U/min for 10 min. In a series of 44 isolated autoperfused small intestine segment experiments changes in gut segment vascular resistance (R), blood flow (F) and arterial perfusion pressure (P_A) were followed during oxytocin infusion. Mean systemic arterial pressure (P_S) and heart rate (HR) were also recorded. Response of gut segment R was biphasic, a decrease during first 3 min infusion followed by dose related increase throughout remainder of infusion period. After 10 min R was 10% above initial level with lowest dose and 60% above with highest dose. Similarly, P_A showed dose related decrease followed by increase. F response was also biphasic, increase followed by decrease, except at highest dose where F decreased during entire infusion period. P_S also showed transient dose related depressor response. HR was slightly decreased. After a 60 min recovery period the infusions were repeated. Transient dilation was no longer seen. R, P_A and P_S increased throughout entire second infusion period. R increased to same extent after 10 min as during the first infusion. Response of hepatic arterial vessels to oxytocin was much more variable, but usually consisted of slight dilation after 10 min infusion. (Work supported by Central Ohio Heart Chapter and N.I.H.)

PROPERTIES OF GLUCOCORTICOID SULFOTRANSFERASE ACTIVITY OF HEIFER LIVER. Mark J. Federspiel and Sanford S. Singer*, University of Dayton, Chemistry Department, Dayton, Ohio 45469.

2:45

We have shown that rat liver preperations contain three enzymes that sulfate glucocorticoids. These enzymes appeared to be of potential physiological and pathological importance. They have already been related to possible glucocorticoid action in enzyme induction, hypertension, aging and diabetes. This report describes the basic properties of the beef liver glucocorticoid sulfotransferase activity and compares it to the rat liver enzymes. This comparison was accomplished after modifying the method reported for study of rat liver. Fresh heifer liver cytosol was fractionated on DEAE Sephadex A-50 columns. This yielded a major glucocorticoid sulfotranferase activity peak, that also sulfated estrogen, and a minor glucocorticoid sulfotransferase activity peak. The kinetic properties of the glucocorticoid sulfotransferase activity in pooled DEAE Sephadex A-50 fractions were studied. Substrate and coenzyme saturation, time course, pH optimum, and other kinetic studies are described. The DEAE Sephadex A-50 pool of glucocorticoid sulfotransferase activity was also fractionated with ammonium sulfate. The ammonium sulfate fraction was used to determine the molecular weight of the heifer liver enzyme by gel filtration. This was compared to the rat liver enzymes.

PULMONARY HEMODYNAMICS IN HEMORRHAGIC HYPOTENSION. Patricia Metting and James N. Ross, Jr. Medical College of Ohio, C.S. #10008, Toledo, Ohio 43699

3:00

Hemodynamic parameters (23) were evaluated in 16 open-chest dogs during 2 hrs. of hemorrhagic hypotension (H) and after reinfusion (R) of the shed blood. Instantaneous main pulmonary artery (MPA) pressure (catheter-tip) and flow (catheter-tip and perivascular probe) parameters were examined including MPA impedance, resistance, and pressure(x) - flow(y) loops (x-y oscilloscope). No significant differences (NS) were found when comparing parameters measured or derived from the two flow probes (flow range 0.3 to 2.6 $L \cdot min^{-1}$, peak flow range 2.3 to 4.5 $L \cdot min^{-1}$). MPA mean, systolic and pulse pressures declined during H, as did stroke volume and mean and peak MPA flow. Pulmonary vascular resistance and impedance parameters (max Z_i, max-min Z_i, f_m, Z_o) did not change (NS) during H or after R. The slope of the pressure-flow loop, an index of pulmonary vascular distensibility, did not change, but area of the loop (right ventricular power index) declined ($P \leq .01$) during H and returned to control after R. NS changes in MPA resistance and impedance indicate that H (2 hrs.) and R need not result in active changes in either the proximal or distal pulmonary vasculature provided that PaO_2, $PaCO_2$ and pH are normally maintained by ventilation. The instantaneous pressure-flow loop constitutes a new hemodynamic index reflecting pulmonary vascular distensibility and right ventricular power on a beat-to-beat basis at the bedside. (Supported by NW Ohio Chap. AHA, BRS and NWOLA grants)

ALUMINO-CALCIUM-PHOSPHORUS-OXIDE (ALCAP) CERAMICS FOR RE-BUILDING THE MANDIBLE. M.J. Freeman, P.K. Bajpai, G.A. Graves, Jr., and D.E. McCollum, Wright State University, Dayton, Ohio, 45435, and University of Dayton, Dayton, Ohio 45469

3:15

The objective and scope of this study was to determine the biocompatibility of alumino-calcium-phosphorus oxide polyphasic ceramic in the jaw of white male rabbits. The significance of this study should relate to the possibilities of replacing destroyed human facial bones and parts thereof. The animals were divided into two groups. Seven control animals received sham implants, three being maintained for three months and four for a total of six months. The surgical procedure included placing the ceramic at the angle of the mandible via an approach in the neck, and securing the ceramic to the bone as tightly as possible. Upon sacrifice the mandible of each animal was surgically removed. The mandible was then sectioned at the site of placement of the ceramic or sham in a vertical fashion. Gross examination of the experimental group specimens revealed an excellent solid continuity between the ceramic and the surrounding bone with no discernible mobility of the ceramic. The control group showed normal healing at the operative site. X-ray examination of the experimental group revealed complete continuity between the implant and the adjacent bone without any evidence of an intervening radiolucency. Energy dispersive analyses of X-rays (EDAX) of recovered ceramics indicated that aluminum oxide stayed within the ceramic. Scanning Electron Micrographs (SEM) suggested mobilization of ceramic calcium and phosphate.

DIGITAL SIGNAL PROCESSING OF RETINAL RECEPTOR POTENTIALS TO STUDY VISUAL EFFECTS OF DRUGS, Ricardo Sanchez, J.M. Jagadeesh and H.C. Lee, The Ohio State University, College of Pharmacy, 500 West 12th Avenue, Columbus, Ohio 43210.

3:30

A noninvasive technique has been developed to study certain visual effects of drugs using receptor potential signals from the eye. A microcomputer equipped with data acquisition hardware was used to control the experiment and collect the data.

A Burien-Allen electrode was used to measure the Electroretinogram (ERG) and a special electrode was developed to measure the Early Receptor Potential. A data link was established between the microcomputer and a PDP 11/34 system equipped with disc, interactive graphics terminal and plotter. The data was transferred from the microcomputer to the PDP 11/34 and was processed using Fourier transform, and other techniques. It was observed that the b-wave amplitude of the ERG in rabbits increased in response to an administration of Chlorpromazine, while it did not effect the a-wave.

Details of the experiments and other visual effects of drugs will be discussed.

ASSESSMENT OF OXYGEN SUFFICIENCY OF THE SUPERFUSED KITTEN PAPILLARY MUSCLE. Joseph M. Surmitis, Jeffrey L. Schmitter and Norman F. Paradise. Northeastern Ohio Universities College of Medicine, Rootstown, OH 44272 (SPON: J. F. Gwinn).

3:45

Papillary fibers were taken from the right ventricles of hearts excised from chloroform-anesthetized kittens. Progressive, stepwise decreases in oxygen partial pressure (P_{O_2}) were produced in the superfusion fluid and corresponding changes in isometric peak tension (PT) development were measured. Mean measured P_{O_2}'s (mm Hg $\pm$ SE) from all experiments at 30 and 37 °C were: 640 $\pm$ 4, 515 $\pm$ 3, 406 $\pm$ 3 and 311 $\pm$ 3. If, under a given set of experimental conditions, the initial decrement in P_{O_2} produced no decrease in PT, it was concluded that the muscle was adequately oxygenated at the highest achievable P_{O_2}. Conversely, if under a given set of experimental conditions, the initial decrement in P_{O_2} produced a corresponding decrease in PT, it was concluded that the muscle may have been inadequately oxygenated at the highest achievable P_{O_2}. At 30 °C and with stimulation rate at 30/min, adequate oxygenation occurred for groups of muscles with mean diameters (m.d.'s) of 0.71 $\pm$ 0.03 and 0.89 $\pm$ 0.03 mm, but the group of muscles with m.d. of 1.09 $\pm$ 0.05 mm apparently was inadequately oxygenated. Fibers with m.d. of 1.15 $\pm$ 0.09 mm were adequately oxygenated at 30 °C when stimulation rate was either 6 or 12/min, but apparently not when rate was 20/min. At 30 °C and with stimulation rate at 60/min, muscles with m.d. of 0.85 $\pm$ 0.05 mm were oxygen insufficient. Data from muscles studied at 37 °C were similar to data reported here for muscles studied at 30 °C. The data from these experiments will permit the selection of experimental conditions which assure an adequate oxygen supply to the entire cross-section of the isolated papillary muscle. (Research supported by the Akron District Chapter of the American Heart Association).

ANALYSIS OF FIRST HEART SOUND AS RELATED TO CARDIOVASCULAR PARAMETERS
Herman R. Weed, Prof. Ohio State Un. 2015 Neil Ave. Columbus, Ohio 43210
4:00 Gerhard Vossius Dr., Un. of Karlsruhe, Karlsruhe, Germany
K. Meyer-Waarden, Prof. Un. of Karlsruhe, Karlsruhe, Germany
H. L. Kwee, Res. Asso. Un. of Karlsruhe, Karlsruhe, Germany

Analysis of the first heart sound has shown the non-stationary character of its spectral analysis both throughout a single beat and as a result of changes in heart parameters, such as dp/dt. The research, carried on primarily at the Institute of Biocybernetics of the University of Karlsruhe by a group of researcher's reports on certain theoretical and observed relationships between such parameters as central frequency and dp/dt max; predicted central frequency and muscle tension; temporal frequency change and mitral value opening; and effects of frequency filtering of heart sound to dp/dt max. correlation.

CYBERNETIC MONITORING VIA ADAPTIVE STATISTICAL FILTERING Norman Kenneth Bodenstein, 6718 Taylorsville Rd., Dayton, Oh 45424
4:15

Adaptive Statistical Filtering (ASF) applies the human statistical decision-making ability to hardware. The statistical criteria need not be mathematically regorous but must practically relate to the (physiological) function (s) being monitored. The adaptive mechanism keeps updating the criteria based on the last n measurement. Filters are used to filter out noise and extraneous signals. As the monitoring proceeds, the criteria may be altered to achieve better detection percentages and lower false alarm rates. An ASF system has been proposed to monitor electrocardiograms. Measurements are taken on two features of the electrocardiogram: the R-R interval and the QRS complex. The length of the R-R interval is compared with the lengths of the four (4) previous normal R-R intervals. The (constant) value of the WALSH transform of the QRS complex (SORTV) is then compared to the 15 previous SORTV values. If significance is found for the t Test at the ≈ 0.0005 level and the SORTV value is greater than at least 14 of the previous 15 normal SORTV values, the waveshape is classified as a Premature Ventricular Contraction (PVC). If only t Test significance is found, the waveshape is classified as an abnormal R-R interval, and a warning is given. In addition, if the SORTV value exceeds a threshhold value 3 or more times within a 15 second interval, a warning is given. This procedure, which simulates real time correctly identifies PVCs with a detection probability of 96% and a false alarm rate of 0.3%.

D. MEDICAL SCIENCES

SECOND AFTERNOON SESSION

MEDICAL COLLEGE OF OHIO - HEALTH EDUCATION 110
JOSEPH ZAMBERNARD, PRESIDING

THE CACHEXIC MECHANISM INDUCED BY A MURINE LYMPHOMA. R. M. Gesinski, G. S. Bambeck, S. A. Hite, T. S. Napoletano, H. W. Lorson. Dept. of Biological Sciences, Kent State University, Kent, Ohio 44242.
1:00

Hematological, chemical and immunological analyses of DBA/1J mice implanted with RaVe lymphoblastic lymphoma indicate that the mice die 8-11 days post implant as the result of a progressive drop in hematocrit. During the last four days of life, core body temperature and hematocrit drop steadily from their normal values to 32°C and 20%, respectively, at the time of death. Manometrically determined whole body respiration rate also drops precipitously during the last four days. In the serum, no increases in acid phosphatase, bilirubin, free phosphate, hemaglobin or cell debris is detected, suggesting that red blood cell (rbc) hemolysis is not occurring in the vascular tree. The agglutination of rbcs of normal or tumor bearing animals occurs in the presence of tumor animal serum and bovine serum albumin at 37°C, indicating that a tumor initiated auto-immune response is occurring. Progressive increases in hepatomegally, spleenomegally and rbc osmotic fragility support the contention that antibody containing rbcs are being scavenged by the Kupfer cells of the liver and spleen. These data indicate that the vascular system is incapable of supplying enough oxygen to provide for the life sustaining metabolic energy needs of tumor bearing mice at the time of death.

KINETICS OF IMMUNOMODULATION BY GLYCEROL TEICHOIC ACID IN BALB/C MICE. D. A. Young,* and F. W. Chorpenning. The Ohio State Univ., 484 W. 12th Ave., Columbus, O

1:15

We have previously shown that purified lipid-free glycerol teichoic acid (GTA) is both antigenic and immunomodulatory in mice. In the present study, modulation of the response to sheep red blood cells (SRBC) by cultured Balb/c mouse splenocytes was examined further. Suppression or enhancement of the plaque-forming cell (PFC) response to SRBC in vitro was demonstrated, depending on the dosage. Dosages from 0.1 to 0.5 ug GTA per 10^6 spleen cells consistenly enhanced the primary anti-SRBC response, the degree of enhancement decreasing as dosage increased. However, the peak response occured earlier in time with larger doses and later (day 4 or 5) with smaller doses, thus exhibiting two dose-related effects of enhancement. Amounts greater than 0.5 ug produced suppression when added to the culture system. GTA also enhanced the immune responsiveness of normal splenocytes to suboptimal concentrations of SRBC. These results suggest that GTA may be useful in enhancing antibody formation where there would normally be a poor immune response.

SEARCH FOR A CROSS-REACTING SERUM FACTOR IN THE RaVe MURINE LYMPHOBLASTIC LYMPHOMA
Ernest A. Genovese, Scott A. Hite, Robert T. Heath and Raymond M. Gesinski
Dept. of Molecular and Cell Biology, Kent State University, Kent, OH 44242

1:30

Previously we have shown that the serum of DBA/1J mice implanted with the RaVe lymphoblastic lymphoma agglutinates normal DBA/1J mouse erythrocytes at 37°C. This study attempted to detect a protein factor produced in response to implantation of the RaVe tumor and capable of cross-reacting with a protein component of the normal DBA/1J erythrocyte membrane. We searched for such a component by utilizing Crossed Immunoelectrophoresis. Normal erythrocyte membranes were first fractionated on SDS-PA gels. A 2 cm. wide band was cut out and cross electrophoresed through an agarose gel containing serum from DBA/1J mice implanted with RaVe tumor. We also attempted to detect a cross-reacting immunoglobulin by direct binding on an SDS-PA slab gel of normal DBA/1J erythrocyte membranes. Our failure to detect cross-reactivity by these procedures may indicate that erythrocyte membrane integrity is necessary for a cross-reacting serum factor's target to be antigenic.

AGE-RELATED CHANGES IN THE MACROPHAGE POPULATIONS OF THYMIC EPITHELIAL CULTURES. Lawrence Sirinek and Kenneth Jones, Department of Anatomy, The Ohio State University, College of Medicine, Columbus, Ohio 43210.

1:45

Cultures of thymus epithelium have been used to study the role of the thymus in the maturation of the immune system. Such cultures had been considered to be "pure reticuloepithelial" cultures, but more recent studies have shown that these cultures consisted of a heterogeneous population of cells, including a large number of macrophages.

Age-related changes in the proportions of thymic macrophages were determined in monolayer cultures derived from collagenase-digested murine thymocytes. Macrophages were identified morphologically by the use of histochemical staining reactions for nonspecific esterase and acid phosphatase, and differential cell counts were made. The accuracy of the histochemical tests was confirmed by the ingestion of latex beads. Results from studies performed on BALB/c mice 1 day to 6 weeks of age showed a significant increase in the numbers of macrophages found in cultures from older contrasted to younger mice.

PARTIAL CHARACTERIZATION OF A STRUCTURAL ALTERATION OF RaVe TUMOR MITOCHONDRIA. Scott A. Hite, Robert T. Heath, Raymond M. Gesinski, and Gregory S. Bambeck.

2:00 Department of Biological Sciences, Kent State University, Kent, Ohio 44242.

The RaVe tumor, a methylcholanthrene induced lymphoblastic lymphoma, is a rapidly growing lethal tumor. Our recent work has centered on mitochondrial structure and function. A structural alteration has been observed: a 19,000 D polypeptide, (19P) apparently unique to tumor mitochondrial inner membrane, may be a fragment of an 88,000 D polypeptide present on all normal tissue mitochondrial SDS-PAGE gels but not seen on gels of tumor mitochondria. The question of relation between the "unique" 19P and the missing 88,000 D polypeptide was examined by a double antibody direct localization of antigenic determinants on SDS-PAGE. Antibodies to isolated 19P were purified from rabbit serum and applied to SDS-PAGE gels of normal liver mitochondrial inner membrane. Absorbed rabbit anti-19P were detected by absorbing fluorescein labeled goat anti-rabbit IgG. Failure to observe specific absorption of anti-19P implies that 19P is not antigenically related to any polypeptide normally occurring in mitochondria.

A METHOD FOR THE RAPID QUANTITATION OF MACROPHAGES IN MURINE LYMPHOCYTIC CELL SUSPENSIONS. David Ennist and Kenneth Jones, Department of Anatomy, The Ohio State University, College of Medicine, Columbus, Ohio 43210.

2:15

Since macrophages are known to influence lymphocytic cell interactions in the development of immunological responses, it would be beneficial to be able to estimate quickly the number of macrophages present in a cell suspension before it is employed in an experiment. Such a method of estimating the numbers of macrophages present in a suspension would also allow the investigator to test for any remaining macrophages after cell suspensions have been subjected to macrophage separation techniques.

Murine peritoneal exudate cells and spleen cells suspended in PBS were subjected to a standard histochemical test for nonspecific esterase using α-naphtol acetate as the substrate and hexazonium pararosaniline as the azo dye. The cells were incubated for 5 min, washed, centrifuged, resuspended in PBS and counted in a hemocytometer. Macrophages stained a dark red indicating that they were esterase-positive. Cell counts showed that 73-80% of the peritoneal exudate cells and 15-20% of the spleen cells stained esterase-positive. The validity of esterase staining as a method for identifying macrophages was confirmed by dividing spleen cell suspensions into two aliquots. In one aliquot macrophages were first allowed to ingest carbonyl iron and then removed by magnetic separation. The second aliquout was not treated and was used as the control. The control suspensions showed 15-25% esterase-positive cells whereas the suspensions subjected to carbonyl iron-magnetic separation had only 3-4% esterase-positive staining cells.

RaVe TUMOR: ELECTRON TRANSPORT PARTICLE ALTERATIONS. Tindal, Michael H., Bambeck, Gregory S., Heath, Robert T., and Gesinski, Raymond M. Dept. of Biological Sciences, Kent State University, Kent, Ohio 44242.

2:30

Previous investigations of mitochondria isolated from RaVe lymphoblastic lymphoma implanted in DBA/1J mice have indicated structural and functional defects: a dominant 19,000 D polypeptide apparently unique to tumor, a missing 88,000 D polypeptide, and a significantly decreased P:O ratio with succinate as substrate (1.6±0.2 for liver and 0.6±0.2 for tumor). This study compared the structure and function of electron transport particles (ETP) isolated from tumor and liver mitochondria. Tumor ETP exhibit a five fold increase in oxygen consumption rate over liver ETP: 125±7 nM O_2 consumed/min/mg protein and 29±7 nM O_2 consumed/min/mg protein respectively. SDS-PAGE of tumor ETP demonstrate an altered polypeptide composition compared to liver ETP. Three polypeptides (m.w. 80,500, 70,000, and 42,000) present in liver ETP are absent in tumor ETP. The apparently unique 19,000 D polypeptide of tumor mitochondria is not present in tumor ETP. These data suggest a structural and functional abnormality in the tumor mitochondrial electron transport system.

ROLE OF T-LYMPHOCYTES IN ANTIBODY RESPONSES TO GLYCEROL TEICHOIC ACID. J. W. Oldfather,* and F. W. Chorpenning. The Ohio State Univ., 484 W. 12th Ave., Columbus, Ohio 43210

2:45

Glycerol teichoic acid (GTA), from Gram-positive bacteria, produces such biological effects as cellular and humoral responses, immunomodulation, and membrane binding. We have examined the requirement for T-lymphocytes in antibody responses to purified GTA from Bacillus sp. ATCC 29726. Fischer 344 inbred rats were depleted of T-cells by adult thymectomy, lethal irradiation (600R), and bone marrow reconstitution (ATxXBM). The success of T-cell depletion was demonstrated by the lack of a proliferative splenocyte response to concanavalin A or phytohemagglutinin. Normal and ATxXBM rats responded equally well to a single IV dose (100ug) of GTA. Four days after GTA injection, mean numbers of direct GTA-specific plaque-forming cells (PFC) were increased 8-fold over controls. Indirect PFC were not increased. A nonspecific response to GTA was also observed in ATxXBM rats. Splenic PFC to the specificities of sheep, human, and chicken erythrocytes as well as 1-fluoro-2,4-dinitrobenzene were significantly increased. However, this polyclonal B-cell activation (PBA) was not observed in normal or sham-thymectomized XBM rats. The PBA effect was also observed in normal outbred Sprague-Dawley rats, apparently unrestricted by the presence of T-lymphocytes. Thus, it appears that GTA directly stimulates B-lymphocytes to produce a specific response in the presence or absence of T-cells. However, T-lymphocytes seem to be involved in regulation (suppression) of the PBA effect in Fischer 344 rats, but not in outbred Sprague-Dawley rats.

THE ROLE OF THE MITOCHONDRIA IN THE CONTROL OF CANCER CELL GROWTH RATE. Gregory S. Bambeck. Dept. of Biological Sciences, Kent State University, Kent, Ohio 44242.

3:00

It is proposed here that cancer cells can be divided into three catabolic types based upon three distinct classes of mitochondrial net ATP synthesizing defects. Each type of mitochondrial ATP synthesizing shortfall results in a similar but distinct pattern of intermediary metabolite and adenosine nucleotide pathway shifts which can be correlated with cell growth rate. The mitochondrial alterations increase the survival and growth potential of the cancer cell by a unique interaction with intracellular anabolic systems, glycolysis and physiological substrate supply systems. The entire network is poised in such a manner that effective catabolic chemotherapeutic attack has been successfully employed. Further avenues of investigation may yield even more cancer cell specific chemotherapies which are not very cytotoxic to normal cells. Clinical typing of cancer cells is now possible as the techniques exist for classing cancer cell mitochondria using small tissue samples.

TESTS FOR γ-GLUTAMYL AMINO ACIDS AS TRANSPORT INTERMEDIATES IN THE S37 CELL. Jerald Simmons and Richard Matthews, Dept. Physiological Chem., 1645 Neil Ave., Columbus, Ohio 43210.

3:15

Meister and coworkers have suggested that the γ-glutamyl cycle may function in support of amino acid transport in some systems. The cycle uses glutathione in transpeptidation to form γ-glutamyl amino acids. A cell incubated in a medium containing valine would produce γ-glutamyl valine if using the cycle. Previous studies had indicated valine interacted with amino acid transport systems of the S37 cell. In the present study, S37 cells were exposed to media containing valine (0.5-9 mM) for brief periods (30 seconds-2 minutes). The cells were then lysed and the contents examined by thin layer chromatography with ninhydrin visualization. Valine was clearly detectable, but no indication of the occurrence of γ-glutamyl valine was obtained under various conditions. This result casts some doubt on the significance of the γ-glutamyl cycle in S37 cells.

THE RAVE LYMPHOMA: DOES IT INDUCE TRANSFORMATION? Cynthia J. Galloway, Raymond M. Gesinski, and Robert T. Heath. Department of Biological Sciences, Kent State University, Kent, OH 44242.

3:30

The RaVe tumor is a rapidly growing, murine lymphoma. Increase in tumor mass is supported by either rapid proliferation of the transplanted sample or by recruitment of normal host tissue. The tumor was originally induced in male DBA/1J mice and a male-to-male subline is maintained. A fragment of male tumor is implanted into a female mouse, forming a cross-gender tumor. To examine the significance of recruitment in tumor growth, metastisizing cells are analyzed by C banding for the presence of the Y chromosome. All chromosomes except the Y demonstrate a C band. The presence of the Y chromosome in the cross-gender tumor, indicates that the tumor originates from the transplanted sample. Absence of the Y is evidence of recruitment of normal cells. The minor chromosome has been found in the cross-gender tumor, indicating that the rapid increase in tumor mass is supported by the transplanted sample. To date, no cross-gender cell examined lacks the Y chromosome, indicating that recruitment is not a significant factor in tumor growth. Therefore, the tumor must have a metabolism capable of supporting its development without recruitment.

INTERACTION OF HERPES SIMPLEX VIRUS INFECTED CELLS AND CONCANAVALIN A. Richard Adler, Carol Paquette, Patricia Garrity and Cynthia Szelc. Department of Natural Sciences, University of Michigan-Dearborn, Dearborn, Michigan 48128.

3:45

Cells infected with herpes simplex virus (HSV) develop membrane changes which result in an affinity for the Fc portion of normal immunoglobulin, i.e., Fc receptors (FcR). Binding of Fc fragments to infected cells appears specific for viral cell-surface antigens, since immune F(ab')2 fragments specific for HSV antigens compete for Fc binding sites. Incubation of HSV infected cells with concanavalin A also interferes with binding of the Fc portion of antibody, suggesting similar binding sites. Cells to which con A is bound show a decreased ability to support HSV replication.

CHLORAMBUCIL EFFECT UPON OXYGEN CONSUMPTION OF NORMAL MICE AND MICE IMPLANTED WITH (RaVe) LYMPHOBLASTIC LYMPHOMA TUMOR. Gesinski, Raymond M. and Garfield, Robert F. Department of Biological Sciences, Kent State University, Kent, Ohio 44242.

4:00

Chlorambucil (Leukeron R) is only partially radiomimetic, producing chiefly the lymphoid effects of x-radiation. Mature DBA/1J mice 3-6 months of age were used in this study. Pharmacological dosage of leukeron 0.2 mg/kg body weight was administered orally to mice. Tumor was implanted subcutaneously in right subscapular region. This particular tumor is fatal in 10 days. Oxygen consumption was determined manometrically for one-half hour. The average oxygen consumption of the normal mice was 3.6 ml per hour per gram body weight. Longitudinal determinations of tumor implanted mice revealed these mice reached peak oxygen consumption on the 5th post implant day; 5.8 ml per hour per gram body weight. Animals treated wtih chlorambucil did not reach this peak oxygen consumption until one day later. After reaching peak oxygen consumption there is a dramatic drop in oxygen consumption until death of the animal. It appears that chlorambucil does inhibit the progress of this lymphoblastic lymphoma.

E. PHYSICS & ASTRONOMY

MORNING SESSION

ENGINEERING-SCIENCE 1201
EDWARD S. FOSTER, JR., PRESIDING

ENERGY USEAGE ANALYSIS OF EXISTING BUILDINGS BY AN AUDIT METHOD
by E. William Beans, Department of Mechanical Engineering, The University of Toledo, Toledo, Ohio 43606.

10:15

From an energy audit, one can determine meaningful energy useage data on existing buildings. The data that can be determined are the base lighting and hot water loads and the overall heat transfer coefficient U, for the building. The last parameter is very difficult to determine for an existing building without extensive testing.

The method is to obtain the fuel and electric use records and the number of degree-days for the building and its locality. The energy useage is ploted against the degree-days and a linear regression is fitted to the data. Since heat transfer is a linear function of temperature difference, the slop of the line is the UA for the building. The intercept values are the base lighting and hot water loads.

The results for two buildings which differ greatly in use and age are presented. The overall heat transfer coefficients for both buildings were calculated using accepted procedures. The agreement between the calculated and "experimental" values is within 24%.

10:30
Business
Meeting

F. GEOGRAPHY

MORNING SESSION

ENGINEERING-SCIENCE 2023
JORDAN A. HODGKINS, PRESIDING

THE EFFECTS OF A BARRIER UPON URBAN ACTIVITY SPACE Mary Ellen Mazey, Department of Geography, Wright State University, Dayton, Ohio 45435

9:30

This research examines the effect a physical and political barrier, the Ohio River and the Ohio-Kentucky state boundary, has upon a selected sample's urban activity space. The activity space is defined as the geographical domain in which a specified set of activities takes place, such as social, economic, and service activities. The sample was composed of households in Newport, Kentucky, a community which is separated from the central business district of Cincinnati by the previously mentioned barrier. The method of data collection was a questionnaire. The results which are analyzed graphically and by the multiple regression model show that the barrier is highly influential upon the behavior of the sample. The influence of the barrier upon spatial behavior does vary depending on the particular activity.

AIR POLLUTION AND CANCER IN THE URBAN ENVIRONMENT
David Davis, Dept. of Geog & Planning, University of Toledo, Toledo, Ohio 43606

9:45

Patterns of respiratory cancer and air pollution have been explored on a regional and world wide basis, but on a large scale, correlations between the two are impossible to predict. The urban area represents an unexplored void in this region of medical geography. Several studies have been conducted on air pollution or cancer, but the integration of these studies has not been conducted, except on a limited basis.

It is the hypothesis of this paper that the location of respiratory cancer deaths is related to the geographic distribution of air pollution in the city of Toledo. Respiratory cancer deaths were taken from a three year period. To determine the mortality rate, the deaths were adjusted by age, sex and race. Air pollution is limited to the amount of particulates in the air. While there are other measures of pollution, particulate matter is the best documented in Toledo.

Pollution and cancer mortality rates were aggregated into census tracts, using multiple regression analysis as the means for determining the relationship between the pollution and cancer.

A MODEL FOR GROUNDWATER QUALITY CONTROL IN IRRIGATED AGRICULTURE. Irfan A. Khan, Assistant Professor, Dept. of Civil Engineering, Youngstown State University, Youngstown, Ohio 44555.

10:00

Excessive accumulation of salts in soils and groundwater has plagued the irrigated semiarid and subhumid regions of the world for centuries. All irrigation waters contain at least some dissolved salts. Since a negligible quantity of the salts is used by the plants, the evapotranspiration process leaves highly concentrated irrigation return flows that can contaminate the root zone, underlying aquifers, and adjacent surface waters. A management strategy for quality control of groundwater, called the Accelerated Salts *Tran*sport (ASTRAN) method, is described. A management model consisting of a) an optimization model, b) an unsaturated flow model, and c) a saturated flow model is developed for basin-wide implementation of the ASTRAN method. The San Luis Rey River basin in southern California is used as a case study to demonstrate the capabilities of the management model. It is shown that over a 20-year period, the present rate of degradation of the groundwater in the basin can be reduced by 80% through application of the ASTRAN method. The management model, also, has the capabilities to 1) predict the ionic distribution and the SAR of the irrigation return flows, 2) determine the effect of various pumping and water usage schemes, land use and cropping pattern, and various forecasted hydrologic conditions on the quality and quantity of the groundwater.

APPLICATION OF NATIONAL PARK POLICIES IN GREAT BRITAIN TO THE MANAGEMENT OF THE CUYAHOGA VALLEY NATIONAL RECREATION AREA. Dr. Jim L. Jackson, Director, Oak Hill Center for Environmental Studies, 3505 Oak Hill Rd., Peninsula, Ohio 44264. Mr. Forrest Smith, Wayne General and Technical College, The University of Akron, 10470 Smucker Rd., Orrville, Ohio 44667.

10:15

Environmental Studies of England in the past two years by the authors have concentrated on land use policies in the Lake District National Park of Great Britain. Land use practices that have evolved in England were compared to the management plan of the Cuyahoga Valley National Recreation Area being developed by The U.S. National Park Service in Ohio. The dual charge of providing maximum utilization of the land resource and the preservation of the natural and pastoral setting are common to both areas. Examples of how the need to use versus preservation of the resource are managed in England are helpful in the decision making process in the Cuyahoga Valley.

Farmers remaining on the land enrich the pastoral scene and aid in the care of the landscape. Their presence reduces the number of rangers that might otherwise be required to police the park lands.

Emphasis on hiking and other forms of recreation that require little supervision and specialized facilities by the British should be emphasized in the Cuyahoga Valley National Recreation Area.

10:30
Business
Meeting

G. CHEMISTRY

MORNING SESSION

ENGINEERING-SCIENCE 2034
THOMAS A. EVANS, PRESIDING

COMPUTER-AUTOMATED VAPOR PRESSURE MEASUREMENTS AT HIGH TEMPERATURES.
J. Edwards, Dept. of Chemistry, University of Toledo, OH 43606.

9:00

Study of the reversible vaporization and vapor pressures of materials at high temperatures reveals the chemistry involved, reaction thermodynamics, and thermodynamic properties. We automated by computer the data acquisition from the simultaneous Knudsen and dynamic-torsion effusion method of vapor pressure measurement. The Knudsen cell was interfaced via an automatic vacuum semimicrobalance, a retransmitting potentiometer, and an ADC. The torsion cell was interfaced via a dynamic torsion pendulum, photodetectors, and a digital encoder. The computer collects data from both interfaces and takes the cell temperature from the experimenter at the terminal. With these and previously-stored data, vapor pressures and apparent molecular weight of the vapor are calculated and displayed. Ideal and nonideal torsion pendulums have been treated successfully. This paper will describe the principles of the dynamic (or integral) torsion-effusion method of vapor pressure measurement and details of the interfaces and computer programs. Thermodynamics and chemistry from three chemical systems will be presented: The standard enthalpy of dissociation at 298 K of TiS(g) was found to be 418±3 kJ/mol. The standard enthalpy of vaporization at 298 K of VS(s) to give VS(g) was 548±3 kJ/mol and to give the gaseous atoms was 1004±6 kJ/mol. The standard enthalpy of combination of $MnGa_2S_4(s)$ from the constituent solid binary sulfides was 9±1 kJ/mol.

HIGH TEMPERATURE CHEMISTRY IN THE CADMIUM SULFIDE-INDIUM SULFIDE SYSTEM
S. T. Kshirsagar and J. G. Edwards, Dept. of Chemistry, University of Toledo, OH, 43606.

9:40

Thermodynamic data for intermediate compositions in the $CdS-In_2S_3$ system would be useful for crystal growth and thin film preparation of $CdIn_2S_4$ which is a chemically stable semiconductor material and is being tried for photovoltaic solar cells. This paper describes our investigation of the vaporization and thermodynamics of $CdIn_2S_4$. Vapor-pressure measurements are by the computer-automated Knudsen-Torsion-Effusion method. Along with $CdIn_2S_4$, other compositions in the pseudobinary system $CdS-In_2S_3$ were prepared. A chemical formula for these compositions may be written as $Cd_{1-x}In_{2x}S_{1+2x}$, where x = 0.0, 0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 1.0. The end members, viz., CdS and In_2S_3 are known to crystallize in the wurtzite and spinel structures, respectively. In the present study, a complete solid solubility was observed in the composition range $0.5 \leq x \leq 1.0$ and these compositions had spinel structure. In the range $0 \leq x < 0.5$, no miscibility was observed and compositions were mixtures of CdS and $CdIn_2S_4$. From the vaporization studies, the third law enthalpy values at 298° K of vaporization reactions can be calculated.

VAPORIZATION CHEMISTRY AND THERMODYNAMICS OF THE LEAD-INDIUM SULFUR SYSTEM.
R. Haque and J.G. Edwards, Dept. of Chemistry, Univ. of Toledo, OH 43606.

10:00

Interest in ternary sulfides arises from their recent increased application in photovoltaic devices. Vapor deposition and vapor transport are frequently-applied techniques. We have deduced the vaporization chemistry of the $PbS-In_2S_3$ system and measured vapor pressure as a function of temperature and composition. Our computer-automated simultaneous Knudsen and dynamic torsion effusion equipment was used. Vapor pressures and apparent molecular weights of the effusing vapor were displayed in real time. The vaporization reaction was $PbIn_2S_4(s) = PbS(g) + In_2S_3(s)$. The apparent molecular weight showed stoichiometry changes in the indium sulfide: $In_2S_3(s) = In_2S_{3-x}(s) + [x/2]S_2(g)$. For the vaporization reaction, from Knudsen data: $\Delta H°(298)$ 3rd-Law ≡ 60.12 ± 0.02 kcal, $\Delta H°(298)$ 2nd-Law = 59.10 ± 0.44 kcal; and from torsion data: $\Delta H°(298)$ 3rd-Law = 60.09 ± 0.02 kcal, $\Delta H°(298)$ 2nd-Law = 60.58 ± 0.44 kcal. The stability of $PbIn_2S_4(s)$ with respect to its constituents, PbS(s) and $In_2S_3(s)$, is 5.0 ± 1.5 kcal mol^{-1} and $\Delta Hf°(298)$ of $PbIn_2S_4(s)$ is 113.5 ± 7.0 kcal mol^{-1}. Residual indium sulfide vaporized by $In_2S_{3-x}(s) = In_2S(g) + [(2-x)/2]S_2(g)$. For this reaction $\Delta H°(298)$ 3rd-Law = 149.34 ± 0.51 kcal mol^{-1} where Knudsen and torsion values have been averaged. The unit cell of $PbIn_2S_4(s)$ was orthorhombic with a = 2.275 nm, b = 1.356 nm, and c = 1.953 nm.

A MICROCOMPUTER CONTROLLED SOLID WASTE EXTRACTOR

10:20

Marc D. Porter and Brent E. Huntsman
Department of Chemistry and Brehm Laboratory
Wright State University Dayton, Ohio
45435

Due to increasing environmental awareness new techniques for evaluating problems associated with solid waste storage have been developed. Recently the U.S. Environmental Protection Agency has issued guidelines for a method which emulates the interaction of water runoff and the suspect waste. This study semi-automated the proposed extraction using a microcomputer and a custom-built stainless steel extraction vessel. The computer controls the pH of the extraction. The vessel provides a continuous mixing of the waste with the weakly acidic solution. Programming, interfacing, and construction of the system will be described. Comparison of the EPA method and the semi-automated procedure will be given.

USING COMPUTERS IN HIGH SCHOOL AND COLLEGE CHEMISTRY. Francis X. "Frank" Tafuri. 162 Ruskin Drive, Cincinnati OH 45246.

10:40

Computers may be employed to write ionic- and oxidation-reduction-type equations from user-inputted combining compounds. Benefits of the time-saving and information storage capabilities of computers allow both functional and non-functional reactions to be noted with minimal time expenditure and can, as well, note information such as electronegativity values and decomposition products for each particular reaction.

Such computer-performed operations might be beneficial, especially to high school and college students studying chemistry, both (1) from a learning standpoint, in the organizing of information and in the writing of programs; and (2) from a standpoint of precision and time-saving in the laboratory itself. Unfortunately, most computer jargon involved might seem too difficult--if not inaccessible--for students with only a reasonable familiarity and facility with the BASIC language.

Through the use of single-dimension matrices, information such as chemical symbols and valences (for ionic equations) or half-cell equations (for "redox" reactions) may be stored in separate matrices (e. g., one for valences, one for symbols, etc.) with each ion or half-cell equation having the same corresponding matrix subscripts between them. By matching chemical names using an IF-THEN conditional with a GOTO loop, the subscript can be found. Valence numbers or number of electrons are balanced, results are checked for special cases against an additional matrix, and the correct equation is then printed.

G. CHEMISTRY

AFTERNOON SESSION

ENGINEERING-SCIENCE 2034
THOMAS A. EVANS, PRESIDING

2:00
Business
Meeting

PART-PER-TRILLION LEVEL ELECTRON CAPTURE - GAS CHROMATOGRAPHY AND GAS CHROMATOGRAPHY-MASS SPECTROSCOPY METHODOLOGY FOR HEXA-, HEPTA-, AND OCTA-CHLORINATED

2:20 DIBENZO-p-DIOXINS IN BOVINE ADIPOSE AND LIVER TISSUES

G.F. VanNess, J.G. Solch, T. Mazer, M.L. Taylor, and T.O. Tiernan,
Brehm Laboratory, Wright State University, Dayton, Ohio 45435

Recently, the wide use of pentachlorophenol (PCP) wood preservatives has been implicated as a source for the introduction of the higher chlorinated dibenzo-p-dioxins into bovine products. Results of an initial survey using bovine tissue obtained from dairy cattle confined in a barn constructed from PCP treated lumber indicated that measurable levels (0.05 - 27 ppb) of hexachlorodibenzo-p-dioxin (HCDD), heptachlorodibenzo-p-dioxin (HPCDD), and octachlorodibenzo-p-dioxin (OCDD) were present in some bovine samples. The apparent need to determine polychlorinated dibenzo-p-dioxin contamination of market bound beef prompted a United States Department of Agriculture (USDA) funded study to develop a rapid and reliable analytical method for the determination of picogram/gram (ppt) levels of HCDD, HPCDD, and OCDD in bovine adipose and liver tissues. This talk will describe the developed methodology and its application to the analysis of 220 bovine tissue samples collected by USDA veterinary inspectors at slaughterhouses in Ohio and 22 other states.

A COMPARISON OF EASTERN AND WESTERN OIL SHALES BY PY/GC/MS

2:40 Shelley J. Coldiron and John H. Garrett
Brehm Laboratory
Wright State University
Dayton, Ohio 45435

Most research thrusts on derivation of oil from shale have focused upon the tri-state oil shale reserves of Utah, Wyoming, and Colorado. In comparison, little is known of the potential oil reserves existing in the shales of the Appalachian area. Several representative samples from both Eastern and Western shales were analyzed by pyrolysis/gas chromatography/mass spectrometry. A comparison of the pyrolyzed products will be made to assess the significance of similarities and differences between these regional samples.

BEHAVIOR OF POTASSIUM SULFIDE AT HIGH TEMPERATURES

F. Sibieude and J. Edwards, Dept. of Chemistry, Univ. of Toledo, OH 43606

3:00

The need to recover potassium carbonate seed from coal-fired magnetohydrodynamic generators has caused a need for accurate thermodynamic information about $K_2S(s)$ and its vaporisation products at high temperatures. Existing thermodynamic data are sparse and from very old works. The melting point of K_2S is 948°C. We have conducted a series of investigations to discover suitable containers for studying K_2S at high temperatures. Induction heating in a graphite susceptor or direct induction heating of electrically conducting materials as well as radiative heating in a vacuum, resistance, tube furnace were used. Commercial, "99.9%", K_2S prepared in liquid ammonia, was heated in a series of experiments in crucibles constructed of glass, boron nitride, graphite, and tungsten. The K_2S was found to interact with or diffuse out of all except tungsten. Experiments in tungsten revealed that the melting point of the K_2S was below 550°C and that the residues were not K_2S. Subsequent analyses revealed impurities in commercial K_2S. The nature of the impurities has not been determined but the residue of the high temperature runs in high vacuum in both tungsten and glass containers showed X-ray diffraction lines of oxygen containing compounds. A direct synthesis of K_2S was performed by reaction at 200°C in vacuum of sulfur on an excess of potassium in an apparatus permitting a preliminary purification of potassium and sulfur separately. Investigations of the behavior of K_2S obtained by direct synthesis are in progress.

THE EFFECTS OF HIGH TEMPERATURES ON POTASSIUM SULFITE.

L. Grimes, J. Edwards, F. Kohl, and C. Stearns, Dept. of Chemistry,
3:20 University of Toledo, OH 43606.

Observations of $K_2SO_3(s)$ as a condensate from reducing regions in flames containing sulfur and potassium has aroused interest in the high-temperature thermodynamics of $K_2SO_3(s)$. Older chemical literature states that $K_2SO_3(s)$, when heated, decomposes yielding $SO_2(g)$, or that it disproportionates to give $K_2S(s)$ and $K_2SO_4(s)$. We heated high purity commercial samples of potassium sulfite at 700-900°C in specially designed effusion cells in an effort to find a suitable cell material for determining the decomposition reactions and thermodynamic properties. Decomposition and vaporization studies were done by radio induction heating in a graphite susceptor and by resistance heating in a vycor furnace. Cells constructed from glass, porcelain, boron nitride, and platinum were used. Mass spectrometry was used to determine the nature of the gases produced upon decomposition. When heated in vacuum, high purity commercial samples initially yield potassium vapor only. Extended heating yields volatile products which have been tentatively identified as S and K_2S. The residue contains a high fraction of K_2SO_4. Initial observation of potassium vapor by mass spectrometry is explained by the presence of K_2CO_3 as an impurity in K_2SO_3. Our results support the proposal that K_2SO_3 disproportionates on heating. Continuation of this work will include preparation of carbonate-free K_2SO_3 and investigation of the disproportion directly by mass spectrometry.

SPECIFIC METAL ION MASKING IN ALKALINE SOLUTION.

Kenny D. Brown and Gordon A. Parker. University of Toledo, Toledo, Ohio 43606.

3:40

As a preparatory step in a proposed specific ion electrode procedure for heavy metal determination, undesired metals may need to be masked to avoid interferences. It has been determined that the selective isolation of the "classical" heavy metals can be accomplished as a group or singly for sulfide precipitation at elevated pH values and measurement with a specific ion electrode. The procedure is reviewed in this presentation.

H. SCIENCE EDUCATION

FIRST MORNING SESSION

ENGINEERING-SCIENCE 2252

G. DENNIS COOKE AND VICTOR J. MAYER, PRESIDING

JOINT SYMPOSIUM

SPONSORED BY SECTION R, ECOLOGY AND SECTION H, SCIENCE EDUCATION

LAKE ERIE AS A RESOURCE AND THE ROLE OF THE OHIO SEA GRANT

8:30 ASSESSMENT OF LAKE ERIE WATER QUALITY Charles E. Herdendorf, Center for Lake Erie Area Research, Ohio State University, Columbus, Ohio 43210

A five-year assessment of nutrient control efforts was conducted in the Western and Central Basins of Lake Erie during the period June 1973 to June 1978. The objective of the study was to determine recent trends in lake eutrophication and water quality which may be related to recent attempts to control nutrient loadings to these basins. The assessment was accomplished by visiting approximately 50 stations at nearly monthly intervals during the ice-free periods. Data from previous limnological surveys as far back as 1928 were compared with the results of the present study to establish long-term trends, as well as recent trends since the last comprehensive survey in 1970. The fundamental conclusion of this assessment is that during the first half of this decade no significant decrease in the loading of nutrients to Lake Erie has taken place. Therefore, during this period the concentrations and quantities of nutrients within the waters of the lake have remained relatively stable. An encouraging sign of nutrient control is that although no decreases have been observed, the constant increases which have taken place in preceeding decades have been stopped. Other indicators of eutrophication, such as hypolimnetic oxygen depletion rates, chlorophyll concentrations, methane production, plankton and benthos populations, dissolved solids, and turbidity have remained high since 1970 but also relatively stable.

9:00 RESEARCH IN LAKE ERIE SHORE PROCESSES

Keith W. Bedford, Ph.D
Steven Dingman
Gary Lockwood

The Ohio State University
Department of Civil Engineering
2070 Neil Avenue
Columbus, OH 43210

Preventing the destruction that occurred during the early 1970's and controlling toxic substances in shallow coastal spawning regions are but two specific examples of problems controlled by near shore Lake Erie processes.

Roughly these problems are separated into three broad categories: storm surge flooding, high bluff erosion protection, and sediment transport and resuspension. Significant research directed towards solving these problems is underway and the objective of this presentation is to document the progress and findings of our work. The goal of storm surge flooding research is to identify an optimal strategy for predicting or forecasting such events and with particular emphasis on the shallow Western Basin. Therefore, a brief problem introduction will be made, an overview of current methods presented, and selected approaches to the shallow water problem discussed. Bluff erosion prevention research has concentrated on delineating both the causes and prevention therefore findings about the relative importance of wave attack, drainage and soil type will be presented for a test case site. Finally, the Old Woman Creek sediment transport and resuspension project will be discussed with emphasis on methods of data collection and analysis.

LAKE ERIE FISHERIES AND OHIO SEA GRANT Dr. Jeffrey M. Reutter, Ohio Sea Grant Program, The Ohio State University, 484 W. 12th Ave., Columbus, Ohio 43210

9:30

Lake Erie is the most productive of the Great Lakes and the future looks very bright as most species populations are increasing or at very healthy levels. The goal of Ohio Sea Grant through research, education, and advisory services is maximum yet wise utilization of our Lake Erie resources. In research, we are investigating parasites causing slower growth or mortality in yellow perch, in addition to developing markets for freshwater drum products. Grade "A", competitively priced, sensory acceptable sandwich portions have been produced commercially from Lake Erie freshwater drum, while a method to double fresh shelf-life of fish is being evaluated. In Ohio, sport fishermen caught 3,351,000 walleye in 1979, 1,699,000 more than in 1978. A joint management quota system has been developed for Ohio, Michigan, and Ontario to avoid overfishing of walleye. Ohio's bag limit has been reduced from 10 to 6. Advisories containing over 100 recipes including cleaning methods to minimize PCB uptake are now available for fishermen, although it appears that most species will be below the proposed new allowable limit of 2 ppm. Technological improvements in electric power plant design have been able to reduce fish mortality by over 99%. The Ohio Sea Grant Extension Program is designed to transfer the results of the above research efforts to the public and to allow public input for future research and development. This is accomplished through newsletters (*Making Waves* and *Twine Line*), fact sheets, news releases, and workshops or seminars.

ASSISTANCE PROVIDED TEACHERS BY OHIO SEA GRANT
Dr. Victor J. Mayer, Professor of Science Education and Geology
10:00 The Ohio State University
283 Arps Hall
1945 North High Street
Columbus, OH 43210

Ohio Sea Grant has developed a comprehensive program of assistance to Ohio teachers on ocean and lake studies. It includes the project Oceanic Activities for Great Lakes Schools (OEAGLS), which has developed instructional materials relating to Lake Erie, the Great Lakes and the oceans, especially designed for Ohio schools; workshops to acquaint teachers with available teaching materials; specialized teacher workshops in Lake Erie biology conducted at Stone Lab; programs in lake biology for secondary school biology students in the Sandusky area; and a newsletter for Ohio teachers. The various programs will be described and sample materials will be distributed.

H. SCIENCE EDUCATION

AFTERNOON SESSION

ENGINEERING-SCIENCE 2252
PIYUSH SWAMI, PRESIDING

TESTING FOR OCEANIC AND GREAT LAKES AWARENESS IN OHIO SCHOOLS
Dr. Rosanne Fortner
1:00 The Ohio State University
283 Arps Hall
1945 North High Street
Columbus, OH 43210

Students in grades 5 and 9 in approximately 150 Ohio schools were surveyed to determine their level of knowledge about the oceans and Great Lakes. The students also responded to a semantic differential characterizing their attitudes toward Lake Erie and the ocean. Responses on both the knowledge and attitude sections were compared to the experiences students had related to bodies of water. Those experiences shown to be associated with higher knowledge scores or more positive attitudes can be recommended as possible means of increasing awareness of the world of water.

THE STATEWIDE ASSESSMENT OF EIGHTH GRADE STUDENT PERFORMANCE IN SCIENCE. Ed Corley National Trail HS, RR# 2, New Paris, OH 45347 and Gary Courts, Miamisburg HS, 1860 Belvo Road, Miamisburg, OH 45342.

1:30

In 1976, the Ohio General Assembly mandated the Ohio Department of Education to assess student performance in several subjects, including science in Grade 8. The eighth grade science assessment was prepared under the direction of the Evaluation Center of Western Michigan University, assisted by a content working panel of Ohio science educators. The assessment was administered in April, 1979, in 150 randomly-selected schools to 20 randomly-selected science students in each school. Test results were evaluated both by objective and item analysis. In the Integrated Topics area, six of eight objectives were met or exceeded. In the Physical Science area, three of eight; in the Earth Science area, two of three; and in the Life Science area, two of eight objectives were at or exceeded the minimal expectancy levels set by the panel. In all, thirteen of twenty-five objectives were at or exceeded the minimal expectancies set by the panel. Results indicate evidence that the Physical Science concepts are not well understood. The panel conjectured that this may be due to the lack of exposure or experiential activities in this area. It appears there is adequate evidence that students in Ohio have been influenced by the curriculum reforms of the past years. It appears that students and science educators have responded to the process skills emphasis. A panel will discuss the results and possible recommendations for improving science curricula. The assessment project was supported by a Title IV-C grant from the Federal Government.

PROCESS AND PRODUCT FOR FIELD AND CLINICAL/DIAGNOSTIC EXPERIENCES IN A SCIENCE METHODS COURSE

2:00

Dr. Joy S. Lindbeck
College of Education, University of Akron, Akron, Ohio 44325

A fifty-hour block of time was allocated to the science-methods class for field and clinical/diagnostic experiences. Modules incorporating specific behavioral objectives, evaluative procedures, and designated hours of field and clinical/diagnostic experience were developed. The modules were submitted to a school science supervisor, a science teacher, and a student teacher for critical review. The final set of fourteen modules focused on topics which ranged from laboratory safety to mainstreaming. The product was assessed on topics, objectives, evaluative procedures, hours of field and clinical/diagnostic experience, and degree of active involvement of the reviewers.

"SERP" Anneliese DiGiacomo, 6840 Alter Road, Dayton, Ohio 45424

2:15

In order to improve the effectiveness of field experiences it was felt desirable to achieve a more comprehensive plan.."SERP"..(Student Enrichment Resource Planning). A primary requirement of this plan is that the field experience should provide supplemental information to the course of study in a timely manner. Because the requirements of the plan differ from the normal "canned tour" concept and approach, extra effort has to be expended by the teacher in relation to preplanning and coordination. This particular plan was jointly developed by the Dayton Museum of Natural History-Dayton, OH and the Vandalia-Butler High School-Vandalia, OH. To be timely with respect to curriculum material required the museum trip takes place late enough in the school year to permit application of the knowledge achieved. For the prescribed plan the Museum dedicated one whole day to the hosting of approximately one-hundred-eighty students. Cooperation between the School teaching staff and the Educational Director at the Museum led to the development of the seven different workshop sessions specifically tailored to the student enrichment. It was anticipated that the students would only have time for attending two or three of the workshops. Seven were offered to provide some choice to the students and primarily to distribute the students into small groups. In addition to the workshops, the teacher developed a six page tour guide of selected displays in the Museum. The list of exhibits had an accompanying worksheet which was to be completed and collected at the end of the day. The effectiveness and value of the program was evident from the responses to the questionnaire, class discussion and from the Post Assessment.

METRICS - UPDATE ON RECENT CHANGES IN SI UNITS

2:30

Dr. Evan McFee, Science Education
Bowling Green State University
Bowling Green, Ohio 43402

What is the correct symbol for the litre (liter), L or l? What is the correct way to express land measure, hectare or hm^2? Each year changes in SI units are considered by the International Committee of Weights and Measures and in turn by the National Bureau of Standards. This session is to report on some of these changes and to provide some do's and don'ts for the proper teaching of metrics.

MYXOMYCETES ASSOCIATED WITH SEED PODS IN MOIST CHAMBER: A HIGH SCHOOL LABORATORY EXERCISE IN BIOLOGY.

2:45

Karl Leo Braun, North High School, 701 East Home Road, Springfield, Ohio 45503

This inexpensive laboratory investigation allows the teacher to examine student ability to observe and record biological phenomena. Students usually think of the seed pod as merely a device for propagating a particular species and overlook the many other life forms associated with the seed pod. The biology teacher is probably aware of the interesting ecological relationship that exists between the Pronuba Moth and the Yucca plant, but may not realize that a host of other organisms may be found on Yucca seed pods. In this investigation I have used yucca, milk weed, and redbud seed pods, but many others could be used instead. A simple way to demonstrate the presence of these organisms is to place the seed pods (usually stripped of seeds) in a Petri dish (25x150mm) containing about 50ml of 2% non-nutrient agar. A few drops of sterile, distilled water are added to the seed pods and observations are made daily for about one month. During this time life cycles of many different organisms may be observed, but in this paper I will discuss only the Myxomycetes (plasmodial slime molds). Some of the Myxomycetes identified are: Physarum pusillum, Didymium difforme, D. effusum, D. iridis, Diderma chondrioderma, Perichaena chrysosperma, P. vermicularis, P. depressa, and Echinostelium minutum. The ecological relationships that exist between certain Myxomycetes and their specific seed pod substrata will be discussed.

STREAM SAMPLING UTILIZING A PORTABLE INVERTEBRATE BOX SAMPLER by Paul M. Daniel

3:00

Department of Zoology, Miami University, Oxford, Ohio 45056

Much effort has been expended in recent years to assess stream quality and to follow with programs of stream improvement. A variety of biotic indices have been developed to quantify diversity and indirectly stream quality. Some kind of sampling is a requisite to any such program. Field sampling followed by careful sorting, examination, identification and data analysis make excellent teaching strategies and student projects. The Portable Invertebrate Box Sampler developed by Ellis and Rutter is being utilized increasingly for sampling, and several situations for its use are indicated. Many of the taxa encountered are illustrated and resources for student identification are explained. Several methods for deriving indices are discussed along with limitations, advantages, and disadvantages.

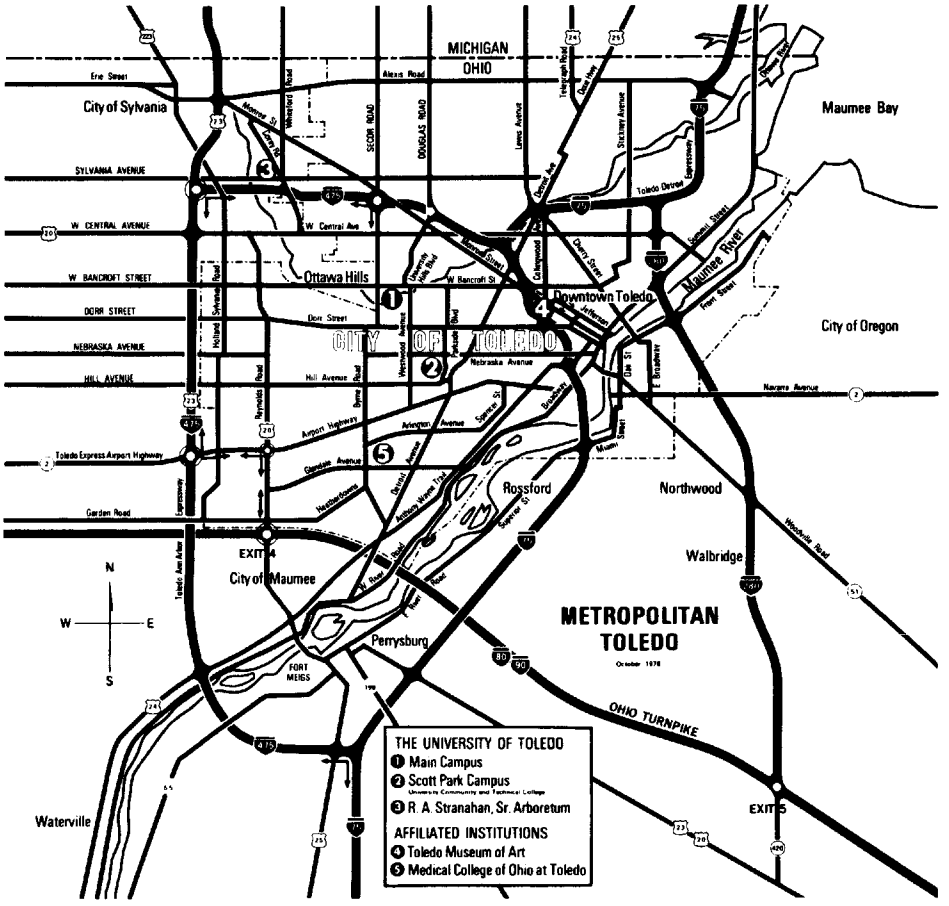
USING INTENSIVE TIME-SERIES DESIGNS FOR CLASSROOM STUDIES OF ACHIEVEMENT AND ATTITUDE

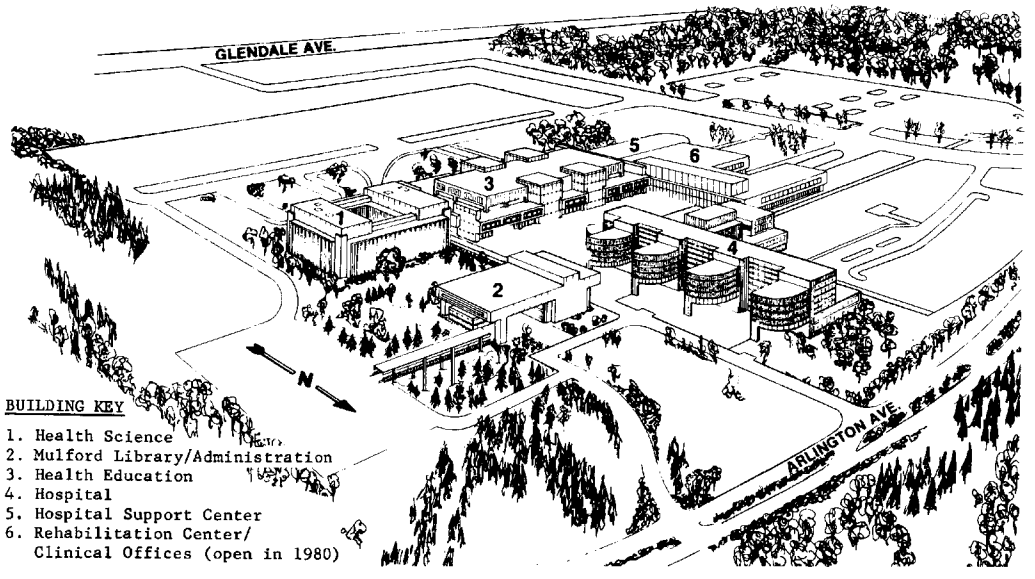
3:15

Carolyn H. Farnsworth
Upper Arlington Public Schools
Columbus, OH 43221

The intensive time-series designs under development at Ohio State have shown great promise for use by teachers and researchers in studying the development of understanding of topics and for demonstrating classroom influences upon student attitudes. One study, designed to identify differences in learning patterns between students at different Piagetian levels when learning the concept of crustal evolution, will be described. The feasibility of the design for use by classroom teachers will be discussed.

How to Get to The University of Toledo





BUILDING KEY

1. Health Science
2. Mulford Library/Administration
3. Health Education
4. Hospital
5. Hospital Support Center
6. Rehabilitation Center/ Clinical Offices (open in 1980)

The Medical College of Ohio

By BUS — Bus Terminal is at Jefferson Avenue and Michigan Street in downtown Toledo. "Old Orchard" bus stops in front of terminal (on Jefferson) and at University's front entrance (fare 45 cents).

FROM DOWNTOWN — From downtown Toledo, board bus marked "Old Orchard." Bus stops at University's front entrance.

BY CAR — from Ohio Turnpike — **Best Route:** Use Exit 4. The Ohio Turnpike Commission has installed directional signs to the University utilizing the interstate highway system. Visitors can choose the turnpike suggested route or can take Reynolds Road north to Bancroft Street (about 7 miles). Turn right. Proceed on Bancroft about 2 miles to the campus main entrance.

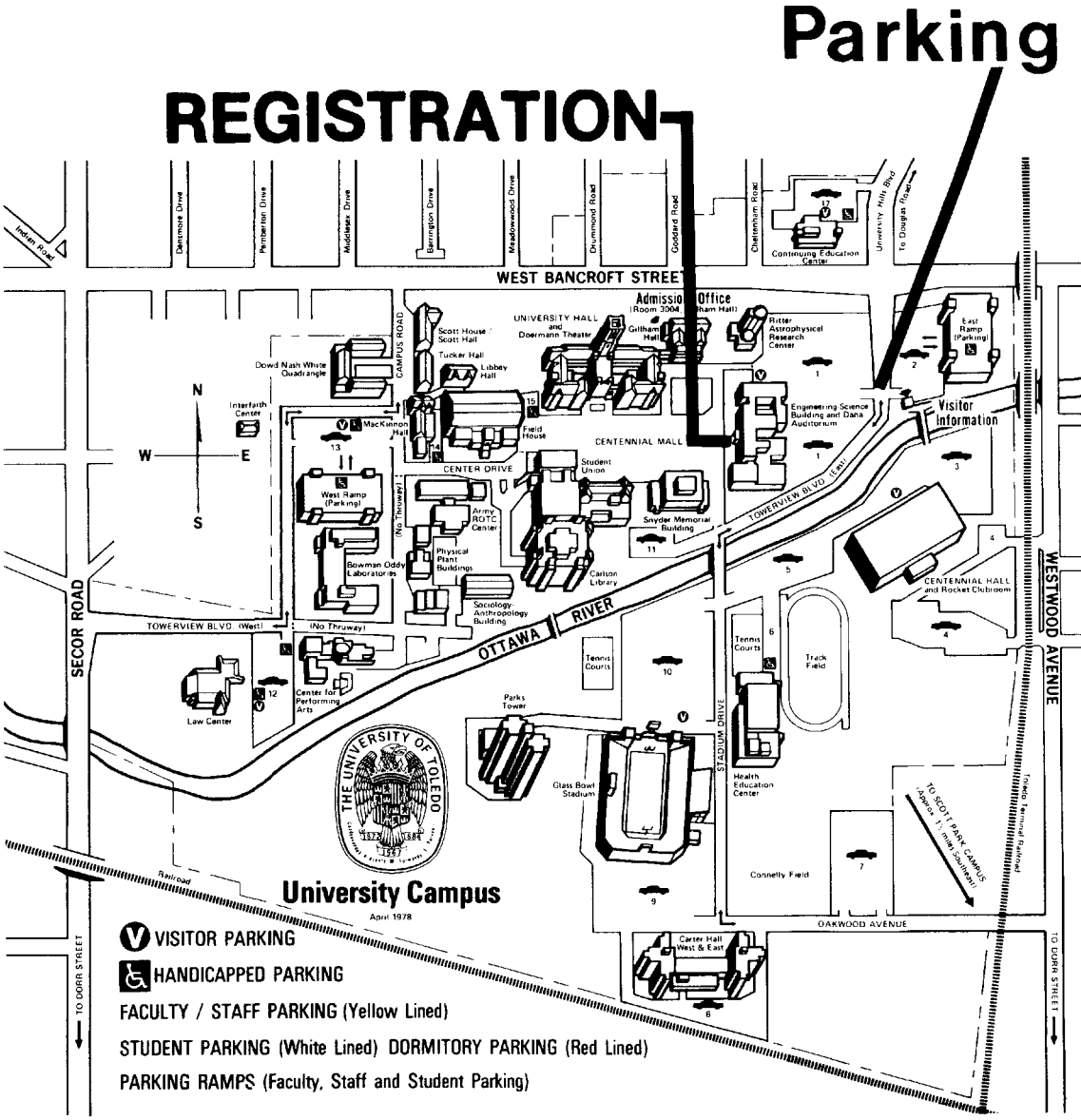
FROM EXIT 5 — Drive north on Detroit-Toledo Expressway (I-280) for about 9 miles crossing Maumee River and passing the downtown Toledo exits. Take I-75 south to I-475 to Secor Road exit (note University of Toledo signs) and south on Secor to Bancroft. Turn left on Bancroft to campus main entrance.

I-75 (from South) — From I-75 bear left at I-475 north. Take I-475 to Secor Road exit. Exit at Secor (note University of Toledo signs). Proceed south on Secor to Bancroft. Turn left on Bancroft to campus main entrance.

US-23 (from North) — From US-23 bear left at I-475 east. Take I-475 east to Secor Road exit (note University of Toledo signs). Proceed south on Secor to Bancroft. Turn left on Bancroft to campus main entrance.

BY AIR — From airport take cab direct to the University or limousine to downtown Toledo where bus service to the campus is available (see above). Rental cars also are available at airport.

BY CAR FROM AIRPORT — Proceed east on Airport Highway to Reynolds Road. Turn left on Reynolds to Bancroft (about 5 miles). Turn right on Bancroft and proceed about 2 miles to campus main entrance.



The University of Toledo

MICROCOMPUTER-ASSISTED TEST CONSTRUCTION IN CHEMISTRY

3:30

Robert G. Williams and John W. Moore
Chemistry Department
Eastern Michigan University
Ypsilanti, MI 48197

The rapid expansion of the microprocessor industry and the accompanying decrease in the cost of hardware have provided many possible microcomputer applications in the chemistry curriculum. One such application is computerized testing, in which many equivalent but unique tests are generated.

Previous attempts to produce computer-generated tests share several faults, including: (1) dependence on medium to large (and therefore expensive) mainframe computers; (2) poor software portability; and (3) inability to handle scientific text. In response to the above problems, we have developed a Zilog Z-80 based microprocessor system with 48K RAM. Peripherals include two dual density floppy disk drives, a video monitor, and a DTC 300/S data terminal providing word processing capabilities and medium resolution graphics. Portability problems are minimized by writing all software in UCSD Pascal. This programming language generates machine independent code, permitting programs to be run on a variety of processors (6800, 6809, 80808, Z-80, LSI-11, PDP-11, and others).

The following three programs comprise the testing system:

(1) INPUT - a scientific text editor to create individual questions
(2) BUILDER - a test generation program
(3) OUTPUT - a text formatter to print the tests

Sample tests will be presented, and specifics of the above programs will be discussed.

FACTORS IMPORTANT TO STUDENT ACCEPTANCE OF COMPUTERIZED TESTING. John F. Gwinn, Department of Biology and Judy Sentieri, Computer Based Education Center, The University of Akron, Akron, OH 44325.

3:45

Computer programs are widely used to supplement classroom instruction with drill and practice routines and tutorials. Computer terminals, however, have been used in relatively few courses to administer tests that will determine the course grade for the student. When traditional test items have been presented within a traditional testing format on a computer terminal the students often expressed considerable anxiety and dissatisfaction toward the experience.

Weekly testing at a computer terminal has been successfully implemented this year in a large, self-paced anatomy and physiology course. Student attitudes toward computer testing were a major concern as this program was initiated. Attitude surveys were given at the beginning, middle, and end of the Fall semester. Preliminary results indicate an increasing level of satisfaction with computer testing. Students generally prefer the computer to paper and pencil testing and reported reduced anxiety with the computer. Questionnaires and interviews have identified major factors contributing to favorable acceptance of computer testing. These factors are associated not only with the testing format and program itself, but also the course structure and the perceived appropriateness of computer testing for a self-paced course. Factors include immediate feedback to response, ability to repeat a test, and scheduling flexibility.

4:00
Business
Meeting

I. ANTHROPOLOGY & SOCIOLOGY

MORNING SESSION

SNYDER MEMORIAL 103
T. NEAL GARLAND, PRESIDING

THE SCHWERDT SITE: A FIFTEENTH CENTURY STURGEON FISHERY IN THE LOWER KALAMAZOO RIVER VALLEY, SOUTHWESTERN MICHIGAN. William M. Cremin, Department of Anthropology, Western Michigan University, Kalamazoo, Michigan, 49008.

9:00

Schwerdt is a single component site of Upper Mississippian affiliation located on the north bank of the Kalamazoo River about 10 km upstream from Lake Michigan. Data recovered from this site as well as several others recently excavated by Western Michigan University have shed much light on a heretofore unknown settlement type--a small community of fisherfolk intent upon exploiting the aquatic and riparian resources concentrated on the valley floor below the site during late spring-early summer of the year. The Schwerdt site is first described and a model in then proposed which incorporates this settlement type, together with the semipermanent agricultural village and the winter hunting camp, in a pan-regional subsistence-settlement system operative during the Upper Mississippian occupation of southwestern Michigan.

THE FORT MEIGS PEOPLE OF THE SOUTHERN SANDUSKY BAY DRAINAGE, Jonathan Bowen, Department of Archaeology, The Ohio Historical Society, 1982 Velma Avenue, Columbus, Ohio, 43211.

9:15

The Fort Meigs Upper Mississippians shared the southern Sandusky Bay drainage area with the indigenous Wolf Late Woodland people from about A.D. 1200 until both groups left the area around A.D. 1500. The Fort Meigs people, whose economy was based on horticulture, hunting, gathering, and fishing, resided in villages consisting of round wattle-and-daub structures about 13 feet in diameter. It appears that each village observed a Feast of the Dead about every 3 years, as was the custom of several historic Algonquian peoples of the upper Great Lakes. The Fort Meigs people may have been Algonquian speakers as well.

BLENNERHASSETT VILLAGE: A PRELIMINARY REPORT

9:30

David N. Fuerst
W. Va. Geological Survey
P. O. Box 879
Morgantown, W. Va. 26505

Blennerhassett Village (46-Wd-38) is a late Early Ft. Ancient site with Woodland and Protohistoric components located on Blennerhassett Island two miles below Parkersburg, W. Va. West Virginia Geological Survey investigation of the site, its size, community pattern and chronological placement, were predicated on plans to develop the Ohio river island into a State Park. Blennerhassett Village is an oval shaped, sedentary site covering .7 ha. with residential structures and other features arranged around an open central plaza. Blennerhassett Village provides significant information regarding the dispersed pattern of small nucleated settlements evidenced during Early Fort Ancient times.

THE WOLF LATE WOODLAND PEOPLE OF THE SOUTHERN SANDUSKY BAY DRAINAGE. Martha Otto, Department of Archaeology, The Ohio Historical Society; Jonathan Bowen, Department of Archaeology, the Ohio Historical Society.

9:45

The Wolf Late Woodland people were an important part of the cultural environment of the Fort Meigs Upper Mississippians who lived in the Sandusky Bay area. Both groups inhabited the area for quite some time before it was vacated about A.D. 1500. The Wolf Late Woodland people lived in villages containing wattle-and-daub structures, and their economy was based on fishing, hunting, horticulture, and gathering. Although they lived in the same environment and exploited it in much the same manner as the Fort Meigs people, the Wolf people retained their own distinctive ceramic, lithic, and bone industries.

HOLISTIC HEALTH: A NEW APPROACH

10:00

JoAnn Collier
2459 Stockbridge Road
Akron, Ohio 44313

Examines the development of the holistic health movement within the social context of the 1960's and early 1970's. The basic elements of holistic health are presented and compared with more traditional approaches to health care. Inherent limitations of the holistic health model are discussed.

CULTURAL CONTINUITY AND CHANGE IN THE REGION OF THE WESTERN LAKE ERIE BASIN. David M. Stothers and G. Michael Pratt, University of Toledo, Toledo, Ohio 43606.

10:10

New and recent information suggests that the Late Woodland Mixter populations of northern Ohio slowly underwent cultural change and demographic expansion as a result of 'Mississippification.' This process of acculturation resulted in the emergence of a new cultural configuration which has been termed the Wolf manifestation. It is suggested that Wolf populations expanded from the region of Sandusky Bay, westward into N.W. Ohio, S.E. Michigan and S.W. Ontario as a result of demographic expansion and an accompanying shift in their settlement-subsistence system. The expansion of the Upper Mississippian Wolf manifestation into the region surrounding the western end of Lake Erie resulted in the withdrawal of the indigenous Late Woodland Western Basin Tradition populations into S.W. Ontario, where they are believed to have been absorbed by their cultural kinfolk, the Ontario Iroquois. It is suggested that Wolf population groups persisted in the western region of Lake Erie at least until the early historic contact period ca. A.D. 1615.

SOCIAL STRUCTURE OF THE HELPING PROFESSIONS: ITS RELATIONSHIP TO CANCER CLIENT REHABILITATION. Louise A. Klasic, Department of Sociology, The University of Akron, Akron, Ohio 44325.

10:25

The highly specialized roles of various types of health care providers may lead these providers to perceive patients' problems only from the perspectives of their own specialties. Since the health care system is strongly influenced by the perspectives of physicians, it is important to examine how physicians in various specialties perceive a given health problem and how the physicians' interpretations influence the services the patients receive from other types of helping professions. This paper reports an exploratory study of these issues. Interviews were conducted with members of three medical and four non-medical professions serving cancer patients in a large northeastern Ohio city. A number of differences were found in the perceptions held by the various types of specialists regarding the needs of cancer patients.

10:35
Business Meeting

I. ANTHROPOLOGY & SOCIOLOGY

AFTERNOON SESSION

SNYDER MEMORIAL 103
T. NEAL GARLAND, PRESIDING

ABORTION STUDY: 1979. Carol Detweiler, Sociology Department, University of Akron, Akron, Ohio.

1:30

A random sample of fifty patients was taken from a private clinic in Northeastern Ohio to establish a difference between patients who returned for a follow-up exam after a pregnancy termination, against those who did not return. A significant correlation was found between returning for the follow-up and the man involved being aware of the situation. The majority of patients were white, single, high school graduates, 17-18 years of age. Half of the sample had had previous abortions. The majority of patients stated that their decision to terminate their pregnancy was easy. Certain variables commonly thought to be significant did not present significant findings. Having the parents aware of the patients situation did not present a significant correlation. Education and emotional reaction to the procedure also did not appear significant.

SUBURBIA: A REVIEW AND ANALYSIS OF SOME THEMES IN THE LITERATURE. Rick Aniskiewicz, Department of Sociology, The University of Akron, Akron, OH 44325.

1:40

This paper attempts to organize the themes that appear in some of the social scientific literature dealing with suburbia. The themes that appear most salient for the purpose of analysis are the diversity of suburban communities, the politics of suburbia, minorities in suburbia, and suburbia and urban change. An analysis of these issues reveals some of the shortcomings of the "suburban myth" in American culture. An analytical framework is presented that allows one to place these issues within the context of the urbanization process in American society.

1:55 ADVANTAGES OF THE SINGLE PARENT: ANDROGYNY AND ITS CORRELATES. Deborah Kuhn, Department of Sociology, The University of Akron, Akron, OH 44325.

The concept of androgyny captures the notion of personal flexibility and the impressive responses of individuals to meet new situational demands. Accordingly, single parents often find themselves in unique situations in which they must successfully perform the various opposite sex roles which had been occupied by the former spouse. This paper examines the correlates of an androgynous sex role identity in single parents and the effects of these correlates on performing parental roles. The impact of the socioeconomic class and the length of time as a single parent on the development of an androgynous sex role identity is also discussed.

COSTS OF INTERVENTION: AGENCY AND FAMILY FRIEND VERSUS INSTITUTIONALIZATION. Thomas Walsh and William Laurie, U.S. General Accounting Office, Room 2933, 1240 East 9th Street, Cleveland, Ohio 44199

2:05

Services received and related costs were developed for a community sample of 1,609 older people in Cleveland, Ohio by well being status. These costs were compared to cost to institutionalize for each well being status. This paper will address the question of when (at what level of impairment) it is more costly to provide services in the community than related costs would be in an institution. Data will be presented on who--public agencies or the family friend network--is currently bearing the costs and what the respective costs would be if the current policy were altered.

For those in the community with the most impaired well being status, costs of services provided in the community were double ($845 versus $458 a month) the related cost to institutionalize. The family friend network was bearing a major portion of the cost to provide services in the community with public agencies providing much less.

Families and friends provide over 50 percent of the services received at all impairment levels. At the greatly impaired level where the break-even point falls, families and friends are providing over $287 a month for services for every $120 being spent by agencies. The families and friends' portion of home services reaches 80 percent at the extremely impaired level ($673 out of $845 a month).

SOCIOECONOMIC FACTORS AND THE MIGRATION INTENTIONS OF UTAH'S YOUTH. Elias T. Nigem, Department of Sociology, Anthropology, and Social Work, University of Toledo, Toledo, Ohio 43606

2:20

Based on a stratified random sample of 2500 of Utah's senior high school students of the class of 1975, the migration intentions of these students were analyzed. Several factors were found to be associated with their migration intentions with some variations as to their place of residence. The data showed that a higher proportion of the rural respondents chose educational reasons followed by social, economic and recreational reasons as the most important in choosing their place of residence, while a higher proportion of the urban and metropolitan respondents chose social, followed by educational, economic and physical reasons.

"SCARED STRAIGHT": THE EMPEROR'S NEW CLOTHES? Stephen B. McConnell, University of Toledo, Department of Sociology, Anthropology and Social Work, Toledo, Ohio 43606.

2:35

The television documentary "Scared Straight" not only won the first Academy Award for a TV show, but was nationally heralded as a realistic means of diverting juvenile delinquents from additional offenses and a life of adult criminality. The documentary is predicated upon the Juvenile Awareness Project Help (JAPH) run by lifers serving time in New Jersey's Rahway Prison. This project takes juvenile offenders into Rahway and subjects them to several hours of brutal, obscene, and abusive language by the lifers, ostensibly scaring 80% to 90% of the delinquents into going straight.

Research done at the Rutgers University School of Criminal Justice indicates the 80% to 90% success rate JAPH asserts is wildly exaggerated and that claims made in the TV film are akin to the emperor's clothing. This paper reviews the Rutgers research and offers a sociological explanation why the public at large, TV reviewers, and officials in the criminal justice system (including juvenile judges) were so quick to embrace a concept of preventative delinquency which borders on hoax. The paper concludes that programs like JAPH, while perhaps well-intentioned, are naive, asociological, and futile and that "Scared Straight" holds false promises congruent with media hype rather than with the reality of empirical results and sociological theory.

TEENAGERS' USE AND NONUSE OF CONTRACEPTIVES. Ronni S. Sterns, David M. Bass, and T. Neal Garland. Department of Sociology, The University of Akron, Akron, Ohio 44325.

2:50

This report is based upon in-depth interviews conducted with 50 female and 10 male teenagers who attended a family planning clinic in a northeastern Ohio city. The interviews covered a wide range of topics relating to respondents' use and nonuse of contraceptives. Included were such factors as social class, age, race, self-esteem, peer influences, religiosity, and quality of relationships with parents. Some promising avenues for further investigation are explored.

LIFESTYLES STUDY
Darlene Violet
3:00 5238 Dungannon Cir.NW
North Canton, Ohio 44720

This 61 item questionnaire study was interested in high school student's attitudes toward traditional marriage and family lifestyles vs. alternative lifestyles. This issue was examined from a symbolic interactionist framework in regards to parent vs. peer importance in shaping adolescents' attitudes toward future lifestyles. A list of fourteen lifestyles was provided from which the student was to pick his first, second, and third choice of future lifestyle. The student was also to pick the three lifestyles he thought his parents would choose for him, and the three lifestyles he thought his best friend would choose for himself. The list of lifestyles ranged from traditional marriage to very liberal lifestyles such as group marriage, communal living, and homosexual marriage. Results showed that the traditional nuclear family lifestyles were chosen most often as a future lifestyle. Living together unmarried was chosen quite frequently and many students expressed a desire to experiment with this lifestyle before settling down to a more traditional lifestyle. Peers were found to be the most influential in shaping the high school students feelings and preferences for particular lifestyles.

RESPONDING TO TRANSITION Dr. Anderson Fanta, University of Michigan, Ann Arbor, Michigan; Allan Wolf, University of Akron, Akron, Ohio.

3:10

The Jew in American society began as an urban dweller. After a period of time these urban areas of residence have been characteristically described as changing neighborhoods. Yona Ginsberg (1975) defines a changing neighborhood as "....an area in which housing is being transferred from the white to the black market."

This study focuses on a Jewish community undergoing racial transition. The hypothesis is: Those who exhibit strong communal bonds will display a higher degree of race prejudice than those who exhibit associational bonds.

Data was collected by interviewing residents in a transitional suburban community. The analysis relates Jewish communal and associational involvement with attitudes and behaviors toward black neighbors.

THE WOLF CULTURE AND THE UPPER MISSISSIPPIAN PRESENCE IN SOUTHWESTERN ONTARIO. Ian Kenyon, William Fox and Peter Reid. Dept. of Sociology and Anthropology. University of Windsor. Windsor, Ontario, Canada. N9B 3P4.

3:25

Mississippian traits (shell-tempered ceramics, ceramics decorated with strap handles, marine shell goods, certain pipe styles, and new traits in the chipped stone and the bone tool industries) occur in southwestern Ontario, dating to the period after AD 1400. These seem to connect southwestern Ontario groups to Upper Mississippian cultures in the US Midwest. They apparently post-date the Middle Mississippian flourescence.

These elements did not arrive in Ontario as a single wave of Mississippian "influence". Considerations of spatial and temporal distributions show that they entered the province at different times, from different sources, and, perhaps, for different reasons. Mississippian elements in Ontario should be recognized, not as the result of a single northward migration of a southern people, nor as the product of some generalized acculturation process of "mississippifaction", but rather as the by-products of the intensified cultural interactions, involving trade, war, tribal dislocations, among other things. Such interactions characterize the eastern Great Lakes' region in the late prehistoric and historic periods.

This paper considers the late prehistoric, non-Iroquoian Wolf archaeological culture, and some other southwestern Ontario manifestations, in the light of the processes involved in the province's "mississippifaction".

J. CONSERVATION

AFTERNOON SESSION

ENGINEERING-SCIENCE 1004
DONNA L. T. SZUHY, PRESIDING

MEMBERS OF THE CONSERVATION SECTION ARE URGED TO ATTEND OTHER SECTIONS FOR TECHNICAL PRESENTATIONS. AN IMPORTANT BUSINESS MEETING WILL BE HELD AT 1:30.

K. GENETICS AND CELL BIOLOGY
MORNING SESSION

SNYDER MEMORIAL 210
RUSSELL CLAYBROOK, PRESIDING

8:30 THE ROLE OF KCl AND 1-METHYLADENINE IN THE SPAWNING OF STARFISH, Keith Roberts and Harold Lee, Department of Biology, University of Toledo, Toledo, Ohio 43606.

Uptake of ^{3}H-1-MA in vitro was examined for gonad fragments of the starfish Patiria miniata. Autoradiographic analysis of incubated samples revealed a localization of the radioactive hormone exclusively in the outer epithelial layer of both testes and ovaries. The reliability of the uptake of the label is supported in both sexes by the retention of label and the ability of unlabeled 1-methyladenine to serve as competitor. The degree of spawning induced by 0.5M KCl in ovaries of Patiria was correlated by histological observations of the maturational state of the ovary. The KCl induced response, unlike that induced by 1-methyladenine, was observed to be independent of oocyte maturation and dissolution of the follicular matrix. Comparison of spawning responses induced by KCl and various concentrations of 1-methyladenine suggests that the spawning responses induced by 1-methyladenine is more than a passive response resulting from follicular breakdown and that 1-methyladenine may have a role in muscular contraction as well.

8:45 CHOLINERGIC CONTROL OF Ca^{2+} UPTAKE OF SPERMATOZOA: AN EM STUDY. Leonard Nelson, Mary E. Gardner, Monica J. Young. Department of Physiology, Medical College of Ohio, Toledo, 43699.

The Gomori method for the histochemical localization of alkaline phosphatase has been adapted for demonstrating potential calcium binding sites at the EM level. Bull spermatozoa subjected to hypotonic plasmolysis in 15 mM KCl permit relatively free diffusion of calcium from the medium into the cell interior. The calcium, precipitated as the phosphate salt at pH 8.0, is transformed by a series of substitutions to cobalt sulfide, which is readily visible lining mitochondrial surfaces, elements of the axonemal complex and the longitudinal fibers. There is evidence that in intact sperm cells a nicotinic receptor functions as an ionophoric channel. This both permits and regulates the movement of calcium along its high electrochemical gradient into the cell. Presumably an ATPase extrusion pump acts to restore the intracellular calcium content to its low "resting" concentration. Physostigmine (an anti-cholinesterase) and ouabain (an inhibitor of transport ATPase) both tend to depolarize the sperm cell as does excess extracellular Ca^{2+}. Intact sperm cells incubated in 5 mM $CaCl_2$ demonstrably take up calcium when the medium contains physostigmine or nicotine. (Supported by BMRS grant #S07-RR-0570008).

9:00 NUCLEOLAR CHANGES IN DEVELOPING MOUSE EMBRYOS. J. Chakraborty. Department of Physiology, Medical College of Ohio, Toledo, Ohio 43699.

This investigation was undertaken to evaluate the pattern of fine structural changes in the nucleolus of mouse embryos as they developed from single-cell zygotes to multicellular blastocysts. Random bred, white, female mice were injected with pregnant mare serum (PMS) followed by human chorionic gonadotropin (HCG) and allowed to mate with proven breeder males. Embryos were collected at various time intervals after HCG injection, fixed, embedded, sectioned and examined with a Philips EM 300 electron microscope. Pronuclei of single cell mouse zygotes contained large, dense, compact nucleoli, composed of fibrous material. No nucleolonema nor intranuclear membrane were present. At the 2-cell stage, the nuclei contained numerous small, round and compact nucleoli without nucleolonema. A large amount of intranuclear membranous component was also detected. During the 4 to 8-cell stages of development, the nucleolus started to differentiate. At that stage, the nucleolus contained fibrillar of granular masses surrounded by nucleolonema. A decreased amount of intranuclear membranous component was consistently found from the 4-cell through blastocyst stages of development. The nucleolus of morulae and blastocysts contained a large amount of nucleolonema. The nuclei became irregular in shape. It appears that, nucleolar differentiation starts with the 4-cell mouse embryo and progresses further with each stage of development. Intranuclear membranes may be of similar nature to those found in human pronuclei. (Supported by BRSG S07-RR-05700-09).

AN IN VITRO STUDY OF THE EFFECT OF MOUSE T-CELL SUBPOPULATIONS ON B-CELL POPULATIONS. Barbara L. Locke and C. Creutz, Biology Department, The University of Toledo, Toledo, Ohio 43606.

9:15

Mouse spleen lymphocytes were isolated from spleen cell suspensions using Ficoll-Paque gradients. These lymphocytes were cultured with Con A (2 μg/ml) in tissue culture media for 30-40 hours. An enriched T-cell population was separated from the culture using rosetting techniques and Ficoll-Paque gradients. Using fresh spleen cell suspensions an enriched B-cell population was isolated using similar techniques. The T-cell subpopulations were separated from the B-cell population with a diffusable membrane and cultured for 4 days with 0.04% suspension of sheep red blood cells. After the four-day incubation IgM production against sheep red blood cells as a function of relative amounts of T- and B-cells was measured using a slide plaque-forming cell assay. The soluble factors from the T-cell subpopulations were the only contact between the B- and T-cells.

THE EFFECTS OF STEROID HORMONE ACTION ON PROTEIN PHOSPHORYLATION IN RAT BRAIN CELLS. Judy Angelbeck and Ernest F. DuBrul, Department of Biology, The University of Toledo, OH 43606.

9:30

Regions of the mammalian brain are responsive to gonadal hormones in the developing animal as well as in the sexually mature adult. In studies of other tissues it has been proposed that the phosphorylation of cellular proteins may mediate steroid hormone action. Therefore, we have studied the effects of different levels of female steroids during the estrous cycle on protein phosphorylation in rat brains using sodium dodecyl sulfate polyacrylamide gel electrophoresis and autoradiography. In vivo and in vitro labelling systems were studied to determine if protein phosphorylation occurs in sexually differentiated brain regions and if it varies with changes in hormone levels during the estrous cycle. Our data shows that there are both qualitative and quantitative differences in protein phosphorylation among different regions of the brain. Furthermore, the amount and specificity of phosphorylation of nuclear non-histone proteins varies with the stage of the estrous cycle in the hypothalamus. (Supported by a grant from the American Cancer Society, Ohio Division.)

AUTORADIOGRAPHIC LOCALIZATION OF IN VITRO LABELED HEPATOCYTES AFTER INTRAPORTAL INFUSION INTO THE RAT LIVER. G. Colin Budd. Medical College of Ohio, Toledo, Ohio 43699.

9:45

Hepatocytes isolated by collagenase perfusion from heterozygous Gunn rat liver were labeled in vitro with 10^{-4}M ^{3}H-diisopropylfluorophosphate (^{3}H-DFP) which reacts with esterases in the cytoplasm of hepatocytes. The cells were washed to remove unreacted ^{3}H-DFP and then transplanted into the liver of homozygous and heterozygous Gunn rats by infusion into the portal vein. Each recipient received up to 10^{8} labeled cells. The viability of the labeled cells, based on dye exclusion and attachment in culture dishes was 40-50%. The liver of each recipient was removed up to 10 days later and processed for histology and autoradiography. Labeled transplanted hepatocytes were observed in the sinusoids and in contact with unlabeled recipient hepatocytes in all lobes of the liver from 1 to 10 days after transplantation. No transfer of radioactivity to recipient hepatocytes was observed. (Supported by NIH Grant #AM 21380).

CYTOTOXICITY STUDIES ON ELEMENTAL PHOSPHORUS USING CULTURED ANIMAL CELLS. Mark T. Wininger, Richard J. Hare, William D. Ross, Monsanto Research Corporation, Dayton, Ohio

10:00

A biological assay for acute cytotoxicity of elemental phosphorus has been developed using mammalian cells in culture. Toxicities of other chemicals to this assay were compared to phosphorus toxicity. A toxic biological effect was detected with as little as 1.2×10^{-7} grams of phosphorus. A gas chromatographic method for the detection of elemental phosphorus (P_4) has been developed. The ultimate sensitivity was found to be at least 2×10^{-12} grams of phosphorus (2 ml of 1×10^{-9} g/ml solution). The amount of phosphorus added to the biological assay was determined by solvent extraction and gas chromatography. A comparative study using a positive standard of cadmium chloride was performed. Dose response curves were developed and the effective concentration (EC_{50}) of P_4 was determined to be 2.1×10^{-7} g/mL. The loss of P_4 in the medium during the exposure intervals was found to be many times greater than the loss due to half-life degradation. Studies were also performed to determine toxicity in relation to the cell cycle. Phosphorus toxicity was found to be much higher during the G1 phase.

ISOLATION AND CHARACTERIZATION OF PEPTIDE TOXINS FROM FRESH-WATER CYANOPHYTES ANABAENA FLOS-AQUAE AND MICROCYSTIS AERUGINOSA. Peter E. Bent and Wayne W. Carmichael, Dept. of Bio. Sci., Wright State University, Dayton, Ohio 45435.

10:15

Toxic fresh-water cyanophyte water blooms (Cyanobacteria) occur primarily in temperate climates. They form in late spring and summer resulting in poisoning of wild and domestic animals, and in certain cases man. Anabaena flos-aquae and Microcystis aeruginosa are responsible for most of these reported cases. A. flos-aquae is known to produce at least four different toxins, designated anatoxins-a,b,c, and d. Antx-c is different than the other anatoxins in survival time and signs of death in laboratory animals. This work will show that M. aeruginosa also produces antx-c, formerly reported as the peptide, microcystin-FDF (fast death factor). Four strains of A. flos-aquae and two of M. aeruginosa producing antx-c were cultured for toxin extraction. Toxin was also extracted from a bloom sample of M. aeruginosa from Edmonton, Alberta, collected in 1979. Freeze-dried cells were extracted in sodium carbonate and sodium bicarbonate. The dried extract was redissolved in water, adjusted to pH3 and ultracentrifuged. The supernatant was treated with n-butanol and flash evaporated. The residue was subjected to Sephadex gel-column chromatography, followed by DEAE Sephadex anion-exchange. Three toxic fractions were found. One causes death in 1-2 hrs., results in liver damage, and shows signs of death similar to cells. The second causes death within 5 min. and shows signs of a tonic convulsant. The third fraction caused death within 30 min. with signs of both fractions. The m.w. of these peptides, determined by gel-column separation is ca. 2000.

K. GENETICS AND CELL BIOLOGY

AFTERNOON SESSION

SNYDER MEMORIAL 210
C. WILLIAM BIRKY, PRESIDING

1:30
Business
Meeting

GENETIC STUDIES OF TWO VISUAL ILLUSIONS Alex Fraser and Kimerly Wilcox, Dept. of Biological Sciences, University of Cincinnati, Cincinnati, OH 45221

1:45

Two new illusions, the "escalator illusion" and the "filling-in illusion," have been discovered and found to elicit polymorphic responses. The escalator illusion is induced by a repeated pattern of segments shaded from dark to light, and involves the perception of illusory movement in the absence of any real motion in the stimulus or surround. Sensitive subjects may see the motion only in the direction of dark to light shading (S_{DL}), only from light to dark (S_{LD}), or in either direction (S_V). Some subjects (21.2%, n=1091) never see illusory movement, or see only brief, inconsistent movement (N). Response patterns in 94 families suggest a fairly strong heritable component to the polymorphism. Concordance for monozygotic twins is 0.90 (29 pair), for dizygotic twins is 0.56 (41 pair), and for siblings it is 0.54 (n=213). There are differences of response type frequencies among faculty and graduate students in Biology, Fine Arts, and Psychology.

The filling-in illusion involves the ability of the perceptual system to "fill-in" rather large gaps in certain types of discontinuous patterned stimuli, both moving and static. The illusion is disrupted by blinking and by non-fixation of a stationary viewing point; wearing contact lenses may reduce or inhibit the illusion. Approximately 20% of a sample of 128 do not perceive filling-in (N_{FI}). Individuals sensitive to filling-in (S_{FI}) have a characteristic lag-time from onset of viewing to perception of the illusion. Family and twin data are in the preliminary stages of collection.

TONGUE ROLLING AND PTC TASTING IN THE CLASSROOM. Alain Corcos and Frankie Brown, Department of Natural Science, Michigan State University, East Lansing, Michigan 48824

2:15

Tongue rolling and PTC are used rather extensively in the classroom to show human diversity. Both characteristics are assumed to depend on one pair of alleles: the ability of tasting PTC and of rolling one's tongue being the dominant characteristics. Our studies on students suggest that tongue rolling is not inherited as a simple Mendelian dominant-recessive trait and that women have a lower threshold than men in their ability to taste PTC.

DEVELOPMENT OF COMPUTER PROGRAMS FOR THE BACILLUS GENETIC STOCK CENTER. S.M. Martin,* M.J. Kaelbling, and W.S. Stalcup. Microbiology Dept., Ohio State Univ., Columbus, Ohio 43210.

2:30

Supported by an NSF grant, the Bacillus Genetic Stock Center (BGSC) was organized in 1978 at Ohio State University to serve as a world depository and distribution center of genetic mutants of Bacillus subtilis and other bacilli. B. subtilis is well known genetically because of transformation and transduction studies, and its sporulation process has been intensively investigated. It also is a potentially important, safe host for recombinant DNA research. The BGSC serves the added function of coordinating strain and allele designations. Information about the strains is stored in a computer to establish a bank which acts as a documentary resource. Computer programs written in the PL/C language utilize this bank to print the BGSC catalog, which includes a listing of strains, an index of traits (with map positions), and a genetic map of B. subtilis. Other programs index the original codes, donors, and sources of the BGSC strains. The program which prints the genetic map of B. subtilis represents a "first" in bacterial genetics. In the past, such maps have been laboriously drawn by hand and irregularly updated. Now, by simply keypunching a card with information about a newly isolated and mapped marker, an updated map can be generated within minutes, with the novel marker in proper juxtaposition with its neighbors. This program could be adapted to printing the genetic maps of other bacteria, such as Escherichia coli, Salmonella typhimurium, and Pseudomonas aeruginosa.

STUDIES IN DROSOPHILA MELANOGASTER OF HAIRLESS (H/+) SELECTION LINES RELATIVE TO LOSS OF THE FOURTH LONGITUDINAL VEIN (L_4). Verl L. House. Department of Genetics, The Ohio State University, 1735 Neil Avenue, Columbus, Ohio 43210.

2:45

High (Hi) and low (L) penetrant H/+ lines have been studied at 22°C, 26°C, and 28°C. Interpreting the incompletely-penetrant distributions as normal relative to vein-forming ability but truncated at a threshold for maximal L_4 presence, it is possible to test an hypothesis of additive effects of the gene differences differentiating the two lines. All such tests at 22°C yield agreement with the hypothesis, 75% at 26°C, but only 20% at 28°C. Standard deviations of the distributions are highly correlated with L_4 presence, increasing rapidly with mean values in the 20% to 50% range and then more slowly in the range 50% to 100%. The degree of skewness of the distributions is also related to mean L_4 values. Interpreting the above relationships as a consequence of a non-linear correspondence between change in genotypic potency and changes on the L_4 phenotypic scale, it is possible to transform the data from the phenotypic scale to a supposed genotypic scale given in sigma (σ) units. To accommodate the fact that variances of the distributions are changing both with mean L_4 presence and with genotype, all data have been transformed to a scale where the change in sigma relative to the change from 40% to 45% of L_4 presence is unity for all genotypes. The transformation permits a calculation of the non-linear genotypic-phenotypic curve. Relative to this curve non-additive relationships on the phenotypic scale become essentially additive on the σ scale.

PERSISTENTLY HIGH MUTATION RATES IN NATURAL POPULATION MUTATOR LINES OF DROSOPHILA MELANOGASTER. R.C. Woodruff, R.K. Brodberg, R.F. Lyman and J.N. Thompson, Jr.,* Department of Biological Sciences, Bowling Green State University, Bowling Green, OH 43403 and *Department of Zoology, University of Oklahoma, Norman, OK 73069.

3:00

Recent evidence shows that mutator factors are common in natural populations of D. melanogaster. However, these mutators are usually suppressed and are only active after crosses between geographically-separated populations or between natural population lines and laboratory stocks. In an attempt to better understand the impact that mutators may have on population structure, we have tested for the ability of mutators to induce recessive sex-linked lethal mutations before and after hybridization; and we have analyzed the "staying power" of these mutators after 10 generations of mating. It was observed that the OK1 mutator line and the Canton-S nonmutator line have low frequencies of lethal mutations before hybridization (OK1 = 2/977-0.20%; CS = 1/1,046-0.1%). After hybridization between these lines and a laboratory stock, there was a significantly higher frequency of mutations in the hybrid progeny of the OK1 line (30/1,085 = 2.8%) than in the CS line (2/1,010 = 0.20%). In addition, the frequency of visible mutations is still high in the OK1 hybrid males after 10 generations. These results indicate that mutators in natural populations of D. melanogaster may cause a broad spectrum of mutation events after hybrid release and this increase in mutation rate may persist for many generations.

THE MUTAGENIC ACTION OF THE ANTITUMOR COMPOUND CIS-PLATINUM(II)DIAMMINODICHLORIDE, IN DROSOPHILA MELANOGASTER. R.F. Lyman, B.A. Earle and R.C. Woodruff. Department of Biological Sciences, Bowling Green State University, Bowling Green, OH 43403.

3:15

The antitumor agent cis-platinum(II)diamminodichloride (cis-PDD) is currently used as a chemotherapeutic agent in the treatment of cancer. cis-PDD has been found to be mutagenic in microbial assay systems and to cause mutations and chromosome breakage in cultured mammalian cells. To better determine the genetic damage produced by platinum compounds in eukaryotic organisms, we have tested for the ability of cis-PDD to induce recessive sex-linked lethal mutations in Drosophila melanogaster. Two-day-old Canton-S males were injected with a 250µg/ml solution of cis-PDD and were mated with Basc females. In a total of three experiments, recessive sex-linked lethal mutations were induced at a frequency of 3.8% (103/2707) in treated flies, a significant increase over the 0.09% (4/4227) of the saline-treated controls. cis-PDD was also found to cause some sterility and possibly to be clastogenic at the treatment concentration.

THE ROLE OF HETEROCHROMATIN IN CHROMOSOMAL MUTATION. Jong Sik Yoon, Department of Biological Sciences, Bowling Green State University, Bowling Green, OH 43403.

3:30

Clusters of breaks at certain intercalary heterochromatic sites producing chromosomal rearrangements were found in several endemic species of Hawaiian Drosophila. In laboratory strains of these species, we found various types of changes in chromosome structure which were predicted in our earlier studies. Therefore, we proposed the pseudochromocenter model for the production of chromosomal rearrangements and genomic changes: First, non-homologous sites which are heterochromatic and contain similar sequences of highly repetitious DNA join in a chromocenter-like configuration. Second, chromatic exchanges by breakage and reunion occur at the ectopically-joined sites. Based on this model, one can predict many new chromosomal rearrangements, some of which have been observed and used to differentiate species. Data from DNA/DNA in situ hybridization and cytochemical studies reveal that these intercalary heterochromatic sites are the A-T rich regions and are originated from the centromeric heterochromatin. Conversely, it has been also found that localized accumulations of heterochromatin are correlated with the absence of chromosome rearrangements. In other words, considerable concentrations of heterochromatin in localized regions such as the microchromosomes may signal reduced potential for rearrangements to occur elsewhere in the genome. With data from 155 species of Hawaiian Drosophila, the possible role of heterochromatin in genome evolution and speciation will be discussed. (Supported by NSF Grant DEB 78-23661)

CHROMOSOMAL HETEROGENEITY IN TISSUE CULTURES OF ARABIDOPSIS. Thomas J. Baribault and Randall L. Scholl. Department of Genetics, The Ohio State University, 1735 Neil Ave., Columbus, Oh 43210.

3:45

Variation in chromosome number in cultured tissues of Arabidopsis thaliana and A. griffithiana was studied in an effort to identify cultural factors which increase chromosomal heterogeneity in these tissues. Source of explant (anthers and germinating seedlings), size of buds from which anthers were taken and sterilization temperature of the culture medium were studied in factorial experiments. The effect of human judgment on variation in chromosome counts was assessed by employment of two microscope observers and was insignificant. Source of explant and species affected the degree of aneuploidy and polyploidy. The culture of younger A. thaliana anthers and the sterilization of the culture medium at a lower temperature reduced chromosomal variation in calluses and increased the frequency of euploid cells, particularly haploids. The occurrence of diploid cells in culture suggests that doubling of the chromosome complement of haploid cultured cells might be made frequent enough for the efficient production of completely homozygous diploid plants.

This material is based upon work supported by the National Science Foundation under Grant No. PCM-7904298.

PROTEIN SYNTHESIS IN ESCHERICHIA COLI RECOVERING FROM FREEZING AND THAWING DAMAGE. Baharrudin A. Ghani and Peter H. Calcott, Dept. of Biol. Sci., Wright State Univ., Dayton, Ohio 45435

4:00

When bacteria are frozen and thawed, the population loses the ability to form colonies on media particularly those containing selective agents. Surviving populations include injured bacteria with damaged cytoplasmic membranes, DNA and outer membranes. Cells also lose the ability to respire, generate energy and utilize it to drive active transport. We have examined the effect of freeze-thaw on another cell process, protein synthesis. Stressed cells show a dramatic decrease in protein synthesis activity which relates not to overall viability but to the level of injury in the population. By comparing the effects of various protein synthesis inhibitors such as chloramphenicol, tetracycline, kasugamycin, streptomycin, puromycin and by using sodium dodecyl sulphate polyacrylamide gel electrophoresis (SDS-PAGE) we have characterized the proteins synthesized immediately after stress. Toluene-treatment of E. coli also results in the dramatic decrease in protein synthesis rates with only outer membrane proteins being synthesized. We have characterized the proteins synthesized in this system with the same inhibitors and SDS-PAGE. We have compared the proteins synthesized after toluene treatment and freeze-thaw with those produced by whole cells to determine whether these stresses act differentially on free and membrane-bound ribosomes.

This research was supported by a grant to PHC from U.S. Army Research Office (No. DRXRO-CB-15525-L) and a research fellowship to B.A.G. from M.A.R.A., (Malaysia).

DIAGNOSTIC DERMATOGLYPHICS. N. R. Haney, D. R. Juberg, K. K. Kessler, and R. C. Juberg, Children's Med. Ctr. and Wright State Univ. Sch. of Med., Dayton, OH 45404.

4:15

Dermatoglyphics, the study of finger, palm, and sole prints, began in the 17th century, and among various scientific applications has recently become a diagnostic aid to medicine, specifically in cytogenetics. By using dermatoglyphic analysis with other tests the clinician can make a more definitive diagnosis.

We study the epidermal ridges of finger, palm, and sole prints to determine a specific pattern. As early as 1892, Francis Galton divided the ridge patterns on the distal end of the fingers into three categories: arches, loops, and whorls. Palmar analysis encompasses dividing the palm into thenar and hypothenar regions, four interdigital areas and defining the presence and character of patterns. Main line analysis involves tracing the exits to defined areas, ridge counting, and sequencing. Toe prints are similarly examined except for the use of fibular and tibial instead of ulnar and radial. Sole configurations are classified into regions with the distal thenar and first interdigital areas combined to form the hallucal area, and determination of patterns and ridge counts.

These dermatoglyphic patterns are described quantitatively by counting the number of ridges within a pattern, measuring distances or angles between specified points and utilizing specific indices. We can then make the association between the dermatoglyphic analysis and chromosomal abnormalities. Dermatoglyphics can be diagnostic in trisomy 21 syndrome (mongolism) as well as applicable in family studies. They are also contributory to the diagnosis in other autosomal abnormalities as well as in sex chromosomal abnormalities.

THE EFFECTS OF COLCHICINE ON THE PHOTOTROPIC RESPONSE OF FERN AND MOSS GAMETOPHYTES. Mary Beth Penn* and C. Creutz. Department of Biology, University of Toledo, Toledo, Ohio 43606.

4:30

Colchicine was applied to agar-grown gametophytes of the fern, Onoclea sensibilis, and moss, Atricum undulatum, to study the chemical's effects on growth and development in directed light. The kinetics of the phototropic response were measured. It was observed that both the rate of growth and the rate of change of growth direction were decreased by the addition of colchicine. Abnormal root systems were noted along with the development of prothallus tissue in the ferns illuminated by red light (these light conditions normally produce slender protonemata in ferns). It is concluded, colchicine causes irregularities in cell division among phototropic gametophytes. Further studies should lead to understanding a control mechanism for growth in plants and the role of microtubules in the phototropic response.

*Supported by a National Science Foundation Student Science Training Program, Summer 1979.

L. MATH AND COMPUTER SCIENCE

MORNING SESSION

ENGINEERING-SCIENCE 2048
RONALD J. WALKER, PRESIDING

SOFTWARE FOR DIGITAL TELEVISION. Subhash C. Kwatra and Chinnabbu Ekambaram, Dept. of Electrical Engineering, The University of Toledo, Toledo, Ohio 43606.

9:00

The use of digital data transmission is increasing very rapidly in all areas of information transfer. Television broadcasters are interested in transmitting TV data digitally because this can minimize the impairments which tend to be cumulative when the signal is relayed many times. The purpose of this research is to investigate the various data compression techniques so the digital TV data can be transmitted at practically acceptable bit rates. The data compression techniques can be classified into three main categories: (i) Differential PCM: TV data is highly correlated. Thus instead of transmitting the data as such we transmit the difference data, difference being between the current data value and a predicted value, and set all difference data values below a certain threshold equal to zero we obtain compressed data; (ii) Transform Coding: the digital video signal is first transformed using an orthogonal transformation and then the resulting data is efficiently encoded. The two most popular transforms for digital TV are the discrete-cosine and the Walsh-Hadamard; (iii) Hybrid Encoding: this uses combination of transform coding and differential PCM coding.

At the University of Toledo we are in the process of developing software to evaluate the various data compression techniques. For multi-burst test TV data, a 69% data compression resulted in mean square error of 0.0415 using the discrete-cosine transform whereas the Walsh-Hadamard transform resulted in mean square error of 0.1563 with 60% data compression. Evaluation of other data compression techniques is in progress.

A MICROCOMPUTER SOFTWARE DEVELOPMENT FACILITY. Michael B. Stalker, SSOE, Inc., 1001 Madison Ave., Toledo, Ohio 43624. Donald J. Ewing, Dept. of Electrical Engineering, The University of Toledo, Toledo, Ohio 43606.

9:25

Development of a microcomputer laboratory began at the University of Toledo in 1975. As courses using the laboratory have attracted increasing numbers of students, the alternatives of purchasing large numbers of small systems or creating a software development system were examined: support of software development using the University time sharing facility was concluded to be the only viable alternative. An Intel cross-assembler has been modified to suit the limitations of DEC FORTRAN for the PDP11, and is accessible from any terminal either on or off campus. Object code may be stored in a user data file and later transferred to any of the IMSAI 8080 systems in the laboratory. Communication between the laboratory machines and time sharing is accomplished through an IMSAI SIO board in each system, and a Gandolf modem which is connected to each. Software selectable Baud rates of 300 and 1200 are available. The IMSAI paper tape monitor has been stored in EPROM, and has been altered to replace the CUSTOM command with a program accessed by use of a monitor command, RSTS. This support program controls communication via the modem, allows transfer of control back and forth between the IMSAI monitor and DEC RSTS/E, and downloads object code into the IMSAI when delimiters associated with object files generated by the cross-assembler are recognized. Examples of the system are presented, and show the development of patches to the IMSAI monitor.

A RELATIONAL INTERFACE TO A NON-RELATIONAL DATABASE

Gary L. Duke, Systems Engineering-Dayton, NCR Corporation, Dayton, Ohio 45479

9:50

Users of a database management system (DBMS) sometimes find themselves "locked" into it and its data manipulation language and into the structure which it imposes upon them. Change and growth can be difficult because of conversion costs involved.

Use of some DBMS' require the skills of highly trained programmers and systems analysts familiar with database design theory and techniques.

While relational database management systems offer a solution to many problems, none are now commercially available.

This paper presents an alternate solution of using a relational interface to currently available databases. A data manipulation language is presented. An implementation example is shown. Some advantages, disadvantages and problems are discussed.

A CONTINUOUS SYSTEM SIMULATION LANGUAGE FOR PERSONAL COMPUTERS. Donald J. Ewing, Dept. of Electrical Engineering, The University of Toledo, Toledo, Ohio 43606.

10:15

Continuous system simulation languages are a valuable tool for students and researchers in all of the physical and social sciences. BDARE, originally written in minimal ANSI BASIC for the PDP11 by Granino Korn, has been modified by the author to run on an 8K Commodore PET.

Features of the language are presented, along with limitations imposed by implementation on the small system.

Application of the language is demonstrated by presentation of the analysis of a biological host-parasite problem and the iterative design of a feedback control system. The presentation will include a demonstration of the language on a PET. Solutions will show the use of graphic displays and numerical listings for presentation of simulation results.

The language presented places a general purpose simulation package within the budget constraints of almost any secondary school or college program. The program should run on any personal computer with Microsoft BASIC. Implementation details of the graphics routines are presented to serve as an aid to those who may wish to install the package on other small systems.

10:40
Business
Meeting

L. MATH AND COMPUTER SCIENCE

AFTERNOON SESSION

ENGINEERING-SCIENCE 2048
GARY L. DUKE, PRESIDING

THE JACKSON ELEMENTARY SCHOOL COMPUTER BASED EDUCATION MATHEMATICS PROJECT
Thomas Warner, Computer Based Education Center, The University of Akron, Akron, Ohio 44325

1:30

During the 1978-79 school year, two sixth grade mathematics classes at Jackson Elementary School in Akron, Ohio, were involved in a study to determine the effects of the daily integration of 15 minutes of Computer Based Education (CBE) mathematics instruction as compared with exclusive non-CBE instruction. Students receiving CBE mathematics instruction achieved significantly higher scores on the California Achievement Test and exhibited more favorable attitudinal responses concerning mathematics learning than those students not receiving CBE instruction. The study demonstrates that the use of Akron's CBE mathematics curricula can be a very powerful tool in the hands of a competent teacher.

PROGRAM SCHEDULING AND MANPOWER ANALYSIS USING MINICOMPUTERS
Donald F. Schmidt, AFWAL/POFE, Wright-Patterson AFB OH 45433

1:55

In the past 20 years, the application of PERT and CPM networks have proven to be an effective yet costly means of scheduling and managing major work efforts, This paper will present a newly developed system utilizing a Mod Comp II - 45 minicomputer in conjunction with computerized graphics capability to present management information to senior and mid-level managers. The system begins with the basic PERT/CPM concepts and is expanded to include "workloading" and "disciplines" as well as activity time estimates. "Workloading" is a term referring to an estimate of the percentage of time that will be spent in accomplishing a particular activity. "Discipline" is the type of labor that will be involved in that activity. Once these inputs, along with the PERT/CPM required inputs, have been made, the system will generate required staffing charts. An interpretation and discussion about the usage of this data is included. In this time of ever increasing program costs, reliable and timely management information is a requirement. This system will provide this information at a low cost. Included are examples of the major output products as well as an explanation of the input files.

MATHEMATICAL AND EXPERIMENTAL MODELING OF THE STRESS DISTRIBUTION AT STIFFENED TUBULAR JOINTS by Adel Sadik, Department of Civil Engineering, The University of Toledo, Toledo, Ohio 43606

2:20

The objective of this study is to investigate the distribution of stress near the juncture of a gusset plate welded to cylinderical tubing. The investigation of this stiffend joint utilizes numerical methods and matrix algebra to solve partial differential equations. IBM 360-75, PDP-11/70 and Univac 1100 systems and supporting software are used.

In the first part of the study, a high-precision finite-element model (ring element) suitable for static analysis of thin cylinderical shells is derived. The principle of stationary total potential energy is used and the accuracy and computation efficiency of such a formulation is examined. Generalized displacements are approximated by high order polynomials. Exact cylinderical shell geometry is incorporated into the element diplacement expressions to insure an accurate representation of the slope and the curvature along the meridian of the cylinder.

The second part of the study is an experimental evaluation. A plexiglass model is examined using the frozen stress technique of photoelastic analysis. The stresses so determined are compared with the analytical results.

This work has application in the analysis and design of space structures, offshore drilling platforms, and related facilities.

ON σ- SINGULAR SUBMODULES. Jitendra N. Manocha. Mathematics Department, Kent State University, 4314 Mahoning Avenue, N.W., Warren, Ohio 44483

2:45

Let R be a ring and σ a kernel functor (left exact subfunctor of the identity functor) on Mod-R. A submodule N of a module M is said to be σ-large if N intersects each non-zero torsion submodule of M non-trivially. If N is σ dense and σ large, then N is large. With σ associate a kernel functor $Z_\sigma(\ )$, the σ-singular submodule, as follows: For a module M, $Z_\sigma(M)$ is the set of elements of M annihilated by σ-large right ideals. (When σ is the identity functor, $Z_\sigma(M)$ is the singular submodule of M.) For a commutative ring R its prime radical is σ-large in $Z_\sigma(R)$. $Z_\sigma(\ )$ is, in general, not idempotent. Rings for which $Z_\sigma(\ )$ is idempotent are investigated. It is proved that the localization functor corresponding to the associated idempotent functor $Z_\sigma(\ )$ is exact and the corresponding ring of quotients is regular and right self-injective. The case when the quotient ring is semi-simple is discussed.

M. PSYCHOLOGY

MORNING SESSION

SNYDER MEMORIAL 205
ISADORE NEWMAN, PRESIDING

RATING SCALE RESPONSE STYLES ACROSS VARIOUS AGE GROUPS. Robert Deitchman, Isadore Newman, Robert Gandee, and Janine Dalton. University of Akron, Akron, Ohio 44325.

9:00

The study of self-report behavior has been studied in the past both within a restricted age sample and without an analyses of various response styles. Examination of the effects of a differential set of anchors on self-description items presented to various age groups will be presented. Attention will be given to the potential methodological benefits of such an approach. Contrasting examples of social desirability and coping mechanisms as they effect self-report data will be presented and discussed.

RISK-TAKING ACROSS THE LIFE-SPAN AS MEASURED BY AN INTRUSION-OMISSION RATIO ON A DICHOTIC LISTENING TASK. Paul E. Panek & William P. McGown, Department of Psychology, Eastern Illinois University, Charleston, Illinois 61920.

9:10

Research and reviews report cautiousness and/or conservatism have often been hypothesized as a manifestation of the consequences of psychological and biological aging. Evidence for this hypothesis comes from various experimental studies, e.g., paired-associate learning; short-term memory; Gottschaldt's Concealed Figures; in which older subjects' performance are marked by more errors of omission (i.e., omitting an answer), rather than errors of commission (i.e., emitting an incorrect answer). In order to determine if avoidance of risk and cautiousness could explain repeated findings of age differences in auditory dichotic listening performance, data from a previously reported study was re-analyzed. Subjects were 175 female volunteers ranging in age from 17 to 72 years who were given a dichotic listening measure of selective attention. An intrusion-to-omission ratio was computed for each subject. Results indicated there were no significant differences in these ratios across the life-span. These findings were taken to indicate that increased cautiousness on the part of the elderly cannot adequately explain age differences in dichotic listening performance.

SITUATIONAL FAVORABLENESS AS A MEDIATOR OF LEADERSHIP EFFECTIVENESS IN SELECTED SECONDARY SCHOOLS IN OHIO. Ronald F. Bobner. 34 Oakdale, Akron, Ohio 44302

9:25

Fiedler's "Contingency Model" of leadership effectiveness postulates that effectiveness of a group is contingent upon the relationship between leadership style and the degree to which the situation enables the leader to exert his influence. This investigation was an attempt to explore the usefulness of the theory as a guide to the study of leadership in public secondary schools. Situation favorableness was calculated by obtaining measures of leader-member relations, task structure, and position power. Each of these three measures was dichotomized. This results in a total of eight possible cells. The majority of the schools tested was classified into only two of these cells. Leadership style was measured by Fiedler's Least Preferred Coworker and leadership effectiveness was measured by Stearn's High School Characteristics Index. The correlations between leadership style and leader effectiveness were calculated and compared to Fiedler's predicted value. These findings will be discussed and their implications explored.

A VALIDITY STUDY OF THE CONFLICT MANAGEMENT SURVEY IN EDUCATIONAL SETTINGS. Awilda H. Clemons. 3220 Rumson Road, Cleveland Heights, Ohio 44118.

9:35

This paper will discuss the two-dimensional approach to conflict management identified by Jay Hall's Conflict Management Survey. The conversion of each dimension (one's concern for personal goals and one's concern for the relationship with an adversary) to a nine-point scale and the identification of five conflict management styles will be presented. Data collected from respondents in the field of education will be reported since the instrument was primarily normed on persons from business and industry. Differing estimates of reliability and validity have been published for this survey. Due to the discrepancy in findings, reliability and validity estimates will be reported based on data from the relationship between responses to the survey and responses to video-taped vignettes of conflict in educational settings. Strategies for analyzing conflict and suggestions for future research in conflict management will be offered.

PREDICTING READING DISABILITY--WHAT DO WE LOOK FOR?
Joan Charlton-Seifert, Beverly Dlugokecki Stratton
The University of Akron, Zook Hall 424, Akron, Ohio 44325

10:00

This study examined whether knowledge of chronological age, sex, I.Q., birth order, number of siblings, evidence of learning problems in the family, and the marital status of the parents accounted for a significant amount of the variance of the criterion, reading disability. A disabled reader was operationally defined as one reading below expectancy and experiencing difficulty achieving under normal learning conditions. Ninety-two students who had been identified by teachers and/or parents as having a reading problem were administered an individual intelligence test, an informal reading test, and a standardized reading test. Determination of individual student's degree of reading disability was estimated through the utilization of a reading expectancy formula. Multiple linear regression was employed to analyze the data. Based on the statistical analysis and the limitations imposed by the study, it was concluded that birth order and evidence of family learning problems do account for a significant amount of the variance in predicting reading disability over and above what can be predicted for by chance.

THE ASSESSMENT OF LEARNING SKILLS IN THE SOCIAL STUDIES OF SELECTED GRADE SIX STUDENTS TO DETERMINE MEANS OF IMPROVING INSTRUCTION. Beverly Dlugokecki Stratton, Joan Charlton-Seifert. The University of Akron, Zook Hall 424, Akron, Ohio 44325.

10:15

The purpose of this study was to evaluate the validity and utility of three informal measures, i.e., the cloze, maze, and Teacher Assessment of Student Performance (TASP), as diagnostic and prescriptive procedures for the classroom teacher. A counterbalanced procedure was used to determine whether a stratified random sample of 119 grade six students could read the assigned social studies text. Multiple linear regression was the statistical procedure chosen to analyze the gathered data. On the basis of the statistical analysis and the limitations imposed by the study, it was concluded (1) that these informal measures are reliable and valid instruments which can be used to improve instruction in the classroom; (2) the measures significantly differentiated the performance of known groups; (3) they correlated highly with the reading comprehension section of the Iowa Test of Basic Skills. Although these informal measures are suggested for use in the social studies, they merit consideration in other content areas as possible diagnostic and prescriptive measures.

BIOFEEDBACK RELAXATION FOR ENHANCING PROBLEM SOLVING IN A COMPETITIVE BUSINESS ENVIORNMENT, Luci Swabb MA, Biofeedback Center, 2043 Rose St., Sarasota, Fl. 33579.

10:30

Four separate groups of personal property investors primarily involved in group problem solving were introduced to biofeedback autonomic nervous system balancing techniques using electromyography and dual hand thermal indicators. Individualized instrument feedback permitted skill achievement to be objectivly verifiable with client body responses serving as the stimulus, the response, and the reward. Next, stressful situations were isolated by group members and rated on an arousal producing scale as enhancing, not affecting or detracting from problem solving. The relationship of stress blocks to creativity was introduced. Right and left hemispheric activity was examined and sensory exercises encouraging right brain skills were presented. The group was then instructed to consider the use of biofeedback relaxing and unblocking techniques during problem solving. Self evaluation questionaires prior to, during, and at program completion indicate both an understanding of biofeedback concepts and basic skill acquisition. Perceptual changes in problem solving approaches were also noted. Two year follow up interviews suggest that transference and retention of the stress reducing and problem solving skills into daily activities is directly proportional to the motivation and skill achievement experienced during the initial training. There was minimal reinforcement training. The impact of the training on problem solving styles seems significant enough to warrent further investigation.

M. PSYCHOLOGY

AFTERNOON SESSION

SNYDER MEMORIAL 205
ROBERT DEITCHMAN, PRESIDING

1:30
Business
Meeting

CARDIORESPIRATORY PARAMETERS COMPARING MAXIMAL BIKE LEG WORK, STANDING ARM WORK AND SITTING ARM WORK IN COLLEGE-AGE FEMALES
M. Winningham, R. Gandee, C. Benz, R. Deitchman, J. Nicolino. Human Performance Laboratory, The University Of Akron, Akron, Ohio 44325

2:00

The purpose of this study was to investigate cardiorespiratory parameters in 10 college-age females during maximal effort in three different body positions: leg (BIKE), standing arm (STAND), and sitting arm (SIT) ergometry. Parameters investigated were: ventilation volume ($\dot{V}_E$), oxygen consumption ($\dot{V}O_2$), heartrate (HR), $\dot{V}O_2$ ml/kg, Systolic blood pressure (SBP), Diastolic blood pressure (DBP), ventilatory equivalent ($VE = \dot{V}_E / \dot{V}O_2$). Data collection was conducted during successive visits to the lab consisting of five minutes' submaximal exercise. Each subject returned to the laboratory for progressively higher workloads until the maximal workload was achieved. Among the findings were a significantly higher SBP in the BIKE than in the STAND and SIT positions, a lower $\dot{V}_E$ in the SIT position than in BIKE and STAND and significantly higher VE in BIKE and STAND position. Maximum attainable workload was significantly higher in BIKE than STAND and SIT, as would be expected with greater leg muscle mass.

Results indicate a difference in physiological response to maximal work in the different body positions and involving smaller muscle masses and suggests a model for the investigation of the differential in psychological perception of physical exertion associated with body positions and muscle masses.

IMMEDIATE AND DELAYED CUED RECALL IN 20-WEEK-INFANTS: A NEW METHODOLOGY. Peg Smith. Psychology Department, The University of Toledo, Toledo, Ohio 43606.

2:10

Two experiments tested cued recall of positional information in 96 20-week-infants following either successive stimulus presentations (Exp I) or anticipatory stimulus presentations (Exp II). Following 6 learning trials, the direction of first fixations to all aperture positions was assessed in the absence of stimuli. During training, infants appeared to be learning stimuli positions by looking ahead as trials progressed, by increasing anticipatory fixations during interstimulus intervals (Exp I), and by increasing anticipations across trials (Exp II). Both experiments revealed evidence that infants recalled the location of the training stimuli. In addition, infants retained serial information after 6-7 days. This methodology was developed to tap infant memory functions in addition to those currently being assessed by picture recognition tasks. By combining prepotent visual stimulus materials and novelty, incidental learning occurred and was tested without pictorial material.

TRANSFER EFFECTS OF NONCONTINGENT REINFORCEMENT DURING PROBLEM SOLVING. Davina Gorzelski Brown. Psychology Department, University of Toledo, Toledo, OH 43606.

2:20

Sixty-four 1st grade boys trained on 2-choice discrimination problems received reinforcement either contingent upon their correct responses or in the same amount but noncontingent upon a correct response. Each group was later tested on a concept attainment task. Reinforcement contingency differences significantly affected the ability to correctly solve subsequent problems. Differences were additionally found in the use of win-stay and win-shift strategies. The data are interpreted as evidence that a prior history of noncontingent reinforcement disrupts the normal sensitivity to feedback consequences thereby interupting the ability to properly utilize future contingent information.

RECOGNITION OF TEMPORALLY INTEGRATED PATTERNS: CAN THE EAR HEAR WHAT THE EYE SEES? Daniel Nordlund, & Peg Smith. Dept. of Psych. University of Toledo, Toledo, Ohio 43606.

2:35

Transfer of sequential information across visual and auditory modalities was examined using hierarchical and non-hierarchical sequences which contained variations in interstimulus times (i.e., phrasing). Subjects previewed sequential patterns of lights or tones twice. On a subsequent test trial, the task was to detect whether or not the sequence had been altered. When the presented sequences were hierarchically structured, detection of a change in a sequence was more accurate than when the sequences were not hierarchically structured. Phrasing facilitated cross-modal detection of a change in hierarchical sequences but did not facilitate performance with non-hierarchical sequences. The results were interpreted as consistent with the notion that amodal stimulus information can be extracted from temporally integrated rule structures.

N. JUNIOR ACADEMY

MORNING SESSIONS WILL START AT 8:00 A.M. A FINAL REVISED PROGRAM WITH SPECIFIC TIMES WILL BE AVAILABLE AT THE REGISTRATION DESK. A BUSINESS MEETING IS SET FOR 3:30 P.M. IN SNYDER MEMORIAL 132.

DESIGN AND CONSTRUCTION OF A SOLAR-ASSISTED HYBRID ELECTRIC VEHICLE

James Ayers 10702 Ramm Rd. Whitehouse, Ohio 43571

This paper covers all phases in the development of a working hybrid electric vehicle. This vehicle utilizes a Renault R5 (Le Car) chassis stripped of all internal-combustion engine components. The car was then fitted with a specially designed fiberglass front end for improved aerodynamic qualities and reduced weight. The vehicle was outfitted like a typical electric vehicle with an enclosed battery pack, an electric motor, and wiring. However, this car departs from the norm in regards to its recharging system. The batteries can be charged in three ways: 1) through the use of photovoltaic solar cells in a permanent installation; 2) through the use of a generator which is powered by a lawnmower engine converted to alcohol operation; or 3) a conventional line-fed charger. An installation was erected on the roof of the author's garage to accomodate the solar cells, and an ethanol-producing still was constructed for the generator drive motor.

Other sections in this paper cover immediate and long-range improvements for the vehicle, such as an interior heating system. Also, extensive testing of the vehicle's performance, range, handling, etc., will be discussed.

MOIST CHAMBER DEVELOPMENT OF MYXOMYCETES ON SEED PODS.

Kenny Blain, North High School, 701 East Home Road, Springfield, Ohio 45503

Yucca, redbud, and milk weed seed pods, collected in central Ohio, were placed in separate Petri dishes (25x150mm) containing 2% non-nutrient agar. Filamentous fungi were visible the day after the dishes were started. Nematods were also clearly visible in all the dishes, but both seemed to be more abundant in the yucca dishes. The redbud dish had fewer nematods. All organisms which developed will be discussed briefly. This paper will deal primarily with the Myxomycetes that develop from the seed pods in moist chamber. About one week after the dishes were started Myxomycete plasmodia were visible. In five more days immature fruiting bodies could be seen, and those in the Yucca dish were identified as Physarum pusillum. In the redbud dishes the plasmodia developed into Didymium iridis fruiting bodies. Perichaena chrysosperma fruiting bodies were found in the milk weed pod dishes. Many Myxomycete plasmodia have been observed in the dishes and when they mature, identification will be possible. It is not clear, at present, whether certain Myxomycetes are associated with particular types of seed pods, or whether their presence is simply a matter of coincidence.

ORGANIC REFUSE INTO USABLE FUEL

Mary Brandes, 3253 Elgin Drive, Akron, Ohio 44313

Our present refuse disposal systems are inadequate, wasteful and polluting; fortunately, two new productive techniques are being developed. The first, anerobic digestion is the natural bacteria breakdown of organic waste under heated conditions. Pyrolysis, the second technique, is the destructive breakdown of high molecular weight compounds. Both of these processes change organic refuse into usable fuel. Experimentation was performed using simulated forms of these two techniques with several variables. The anerobic digestion control, 125 ml of organic refuse heated at 60°C for 5 days, produced 10 ml of a methane and carbon dioxide mixture and a resulting dry material suitable as fuel. Methane-producing bacteria, Bacillus Megaterium, and Enterobacter cloacae were added 40 separate flasks of organic refuse and underwent anerobic digestion. The added bacteria increased the amount of fuel gas produced to 35-65 ml with the remaining dry material suitable for fuel. Various amounts of sludge and fertilizer were added to flasks of organic refuse and also underwent anerobic digestion. They produced 25-35 ml of fuel gas. The pyrolysis control, 125 ml of organic refuse heated at 538°C for one hour, produced 160 ml of the methane and carbon dioxide mixture and char - a highly combustible fuel. Bacteria increased the gas yield slightly. Sludge increased the yield to 180-210 ml. These two processes which produce valuable gas should prove extremely useful in the future as America becomes more energy conscious.

St. Vincent-St. Mary High School, 15 North Maple Street, Akron, Ohio 44303
Sr. Denise Macko, Teacher - Mr. Christopher Hanley, Principal

EFFECTS OF ULTRASONIC WAVES ON THE GROWTH OF *E. coli* AND *B. cereus*.

Gregory Christoforidis 2644 Westchester Rd. Toledo, Ohio 43615

The purpose of this study was to determine the effects of airborne ultrasonic waves of a frequency of 40kHz on *Escherichia coli* and *Bacillus cereus*. A transmitter was constructed which would produce the frequency of 40kHz. In addition two incubators were constructed which could keep a constant temperature of 37°C. The bacteria were grown on nutrient agar and incubated while being subjected to the ultrasonic waves. Controls were treated similarly but without the ultrasonic treatment. Results showed that the ultrasonic waves caused the longevity of the growth of the bacteria to decrease and the bacterial colonies either to die out or form spores after 48-60 hours at a power of 0.1 watts. Further research is being considered to be done on suspensions of bacteria at higher power levels.

THE MINIMUM TEMPERATURE FOR THE DEHYDRATION OF $BaCl_2 \cdot 2H_2O$

Patrick Floyd 3937 Orono Dr. Toledo, Ohio 43614

The purpose of this research is to establish the minimum temperature for the total dehydration of $BaCl_2 \cdot 2H_2O$. Literature sources differ on the temperature at which the water leaves the hydrated barium chloride crystals. The *Handbook of Chemistry and Physics* lists 113°C, while the *Handbook of Chemistry* lists 100°C as the temperature for the water to leave.

Ten samples of $BaCl_2 \cdot 2H_2O$, weighed to the nearest cg., were heated in a standard Sargent Welch oven at 93 C, until a constant weight was reached. It took twenty-four hours for the water to leave.

Next, five samples were also weighed to the nearest cg. These were heated to 73 C, and it took fourty-eight hours for the water to leave.

In conclusion I found that the temperatures in the handbooks are suggested temperatures for the removal of water and not the minimum temperature. The minimum temperature appears to be at or below 75°C. Further research is being done to determine the lowest possible temperature for the removal of the waters of hydration.

THE EFFECT OF GIBBERELLIC ACID ON THE ROOT SYSTEM ON *VIGNA SAVI*

Edward Fugikawa 101 Fairfield Dr. Swanton, OH 43558

The purpose of this research is to investigate the effect of Gibberellic Acid on the root system of *Vigna Savi*. Previous research states that plants would have longer stems and the root system would be adversely effected. This is influenced by other external factors and the age of the plant also influences the growth. This is caused by the elongation of cells and in a few cases by cell division. The hypothesis that both the roots and the stem would grow larger and it was planned to check the structure of the stems but more importantly the roots. Treatment on the roots and stem would be more beneficial that the treatment of the roots only because the coverage was more complete. The pea seeds were inserted between wet newspaper with no nutrients added. 1 mm of a 100 ppm gibberellic acid solution was applied to the the roots, and to the roots and stem on the second. The growth of the treated plants was studied from the seed to a small plant and compared to a non-treated control. Future research will be done including treatment of the stem only. The samples with the roots treated with gibberellic acid produced a plant with a fully developed root system while achieving superior heights. The root and stem treatment produced a root system that was long and sparse while obtaining normal pea height. The control produced a strong root system while obtaining normal pea plant height.

BINARY LOGIC AND THE DIGITAL COMPUTER

Michael Golding, 5909 Whitman Road, Columbus, Ohio 43213

The paper seeks to explain the principle of binary logic underlying digital computer operation. Since the digital computer essentially is an electronic switching machine based upon a system of binary logic, understanding its operation requires a knowledge of this logic system, as well as the way by which the system is electronically reproduced in the machine. Binary logic requires the forced selection of only one of two alternate conditions in conjunction with other "either-or" condition selections, which are stored as "bits" of information. In this manner the number of "either-or" possibilities is geometrically increased as the number of "bits" of information is increased. Consequently information accumulates and is processed through a chain of multiple alternate conditions. Binary logic processing in the computer is achieved by means of the electronic transistor. By discriminating between two current strengths, the computer allows the stronger to pass and so "selects" only one of two conditions. Since many transistors are linked together, the possibilities for "either-or" conditions are multiplied. These conditions are stored as physical positions on toroid mechanisms, or as field variations on magnetic tapes. Rearrangement of information results from programming, which electronically inhibits or facilitates the switching of particular groups of transistors. Thus, by electronically applying binary logic, the possibilities of the computer for processing information can be infinitely expanded.

A CORRELATION OF THE VOLUME OF THE CEREBRAL VENTRICLES TO THE SIZE OF THE CANINE.

Mark Hauman, 1728 Woodhurst Dr. Toledo 43614

The purpose of this research was to obtain casts of the cerebral ventricles of canines and to draw a comparison between the volume of the ventricles and the size of the canine.

First of all, live canines were anesthetized and used both for the present research and medical student training. After the brains were removed and suitable preparations were completed, one of several casting materials was injected into the ventricles. Finally, after the casts hardened, the brain tissue fragments were dissolved away by the action of a sodium hydroxide solution.

At the present time, data is being taken on the volume of the cerebral ventricles and a comparison of the ventricles and the size of the canine is being drawn.

THE EFFECTS OF HEATING TIMES ON ZnS PHOSPHORS COACTIVATED BY $MnCl_2$ and NaCl

David C. Hipp 2044 Heatherwood Dr. Toledo, Ohio 43614

This project was undertaken to scrutinize the effects of various heating intervals on a zinc sulfide phosphor which was coactivated by sodium chloride and maganese II chloride. These phosphors were composed of 1.000 grams ZnS, .0115 grams $MnCl_2$, and .200 grams NaCl and were heated at 1000 degrees Celsius at various time periods of 10, 20, 30, 40, 50, 60, 90, and 120 minutes. The fluorescence of the phosphor was then measured with a spectrofluorometer. The results showed that the heating times affected the amplitude of fluorescence spectrum and formed a smooth upward curve with the peak at twenty minutes. From that point, the heating times adversely affected the brightness and resulted in a downward curve--with longer heating times causing a lower amplitude. The results were compared to a similar project previously done; however, with different heating times and a different composition of the phosphor.

CHARACTERISTICS OF CONCANAVALIN A INDUCED SUPPRESSOR/HELPER CELL ACTIVITY IN NORMAL AND TRAUMATIC INDIVIDUALS

Stephen H. Hite, 59 Harvest Lane, Tiffin, Ohio 44883

This study was performed to investigate the in vitro assay of mitogen stimulation of normal human peripheral blood lymphocytes (PBL) with concanavalin A (con A), and to calculate the percent suppression or enhancement of responder PBL with an autologous or allogeneic con A treated lymphocytes (CATL) in normal and trauma patients.

Normal PBL isolated from whole blood were plated with medium, mitogen, and fetal bovine serum, pulsed with 3H thymidine, harvested, and counted for 3H thymidine incorporation. Normal and trauma patient PBL were plated as responder cells, con A generated and mitomycin C treated, or incubated and mitomycin C treated. CATL and control lymphocytes (CL) were added to autologous or allogeneic responder cells, stimulated with mitogen, and assayed in the previous manner. The results showed maximal stimulation with con A and normal PBL at a dosage of 30 micrograms/ml con A. PBL crosses showed trauma patient PBL suppressed autologous CATL and allogeneic normal responder cells to a significantly high degree when compared to normal patient crosses of the same type. This study indicated a relationship between suppressor cell activity and a traumatic state.

PURIFICATION OF FRACTION I PROTEIN FROM AN AQUATIC WEED (WATER HYACINTH)

Rachel M. Jarvis, Department of Chemistry, University of Akron, Akron, Ohio 44325

Ribulose 1,5-bisphosphate carboxylase/oxygenase (fraction I protein) is an oligomeric enzyme responsible for the fixation of CO_2 during photosynthesis and for the initial step in photorespiration. It is found in every chlorophyll containing organism and is considered the most abundant protein in nature. Because it contains eight of the nine amino acids essential to the human diet and thus possesses high nutritive value, great emphasis is being placed on its isolation in pure (crystalline) form in large quantities so that it might be used to fortify food for human consumption and feed for livestock. Plants currently being utilized include potato, tomato, tobacco, corn, and spinach.

In many underveloped nations aquatic weeds comprise a large percentage of the plant population. Thus such plants are a potential source of extensive amounts of pure fraction I protein. The water hyacinth, which reproduces itself very rapidly and which is considered a pest of major proportions in many countries, would seem an ideal candidate plant. In fact a crude protein concentrate has been prepared from both the leaves and the whole plant [Wolverton, B.C. and McDonald, R.C. (1979) Ambio 8(1), 2-9]. In this study we will attempt to purify the fraction I protein in maximal yield and in crystalline form. Initially the purification procedure will involve those already developed for isolation from tobacco [Chan, P.H., Sakana, K., Singh, S., and Wildman, S.G. (1972) Science 176, 1145-1146] and spinach [Hall, N.P. and Tolbert, N.E. (1978) F.E.B.S. Lett. 96, 167-169]

A SCANNING ELECTRON MICROSCOPIC OBSERVATION OF CELLS FOUND IN DOG CEREBROSPINAL FLUID*

Earl W. Jyung, St. John's High School, 5901 Airport Highway, Toledo, OH 43615

Cellular components of dog cerebrospinal fluid were prepared for scanning electron microscopy by Allen's procedure in order to examine cells in dog (husky) cerebrospinal fluid. Scanning electron microscopy was chosen since it shows detailed surface morphology, which is an important factor in distinguishing lymphocyte types B and T. Preparation for the scanning electron microscope included fixation, filtration, dehydration, critical point drying, mounting, and coating. Cells fixed for 14 to 21 days appeared slightly crenated. Fixation for 8 to 14 days can avoid such distortion. Of the observed cells, most were lymphocytes. The ratio of B to T cells was about 3 to 1. B cells were seen as being villous whereas T cells were relatively smooth. Normal human lymphocytes measure from 3.5u to 7.5u in diameter. The observed dog lymphocytes were 3.0u to 5.0u in diameter. Thus, 3.0u-pore filter was effective in collecting these cells. This procedure has established the fixation time and filter pore size suitable for the preparation of dog cerebrospinal fluid cells for the scanning electron microscopic examination, and should prove useful in future comparative research involving various animal species of different age, sex, etc.

* Sponsored by the National Science Foundation grant for high school students.

INTERMOLECULAR FORCES IN THE TWO-COMPONENT SYSTEM OF PARADICHLOROBENZENE-BIPHENYL

Mark A. Knox, 1545 Indian Creek Dr., Temperance, Mich. 48182

The purpose of this project is to evaluate molecular attraction forces in the two-component system of paradichlorobenzene and biphenyl. To accomplish this, a theoretical phase diagram was compared to a phase diagram made using experimental data. The theoretical phase diagram was made using an equation expressing the relationship between the composition of the two-component system and the melting point of the system. Through the use of the thermodynamic equation, theoretical solidification temperatures were determined. These temperatures were used to form the theoretical phase diagram. The experimental data for the second phase diagram was gathered through the use of cooling curves of pure substances and various mixtures of the substances. The cooling curves showed the relationship between the temperatures of the substances and the duration of their cooling period. The cooling curves also show the solidification temperatures and eutectic temperatures for the two-component systems. These temperatures were used to form the experimental phase diagram. There were two main results of this experiment. First, a simple phase diagram with one eutectic temperature was constructed. Second, by comparison of a theoretical phase diagram and experimental phase diagram, a conclusion was reached about the intermolecular forces acting in the mixture. Because the graphes of actual and theoretical temperatures were nearly the same, it has been concluded that this system is an ideal solution and neither solvation nor association had taken place.

MODIFICATION OF THE CRYSTAL HABIT OF COPPER SULFATE PENTAHYDRATE IN THE PRESENCE OF DOUBLE SALTS

PAUL LAHTI 2460 Valley brook Dr. Toledo 43615

The purpose of this project was to discover if the presence of certain impurities would effect the crystal habit of hydrated copper sulfate crystals. The effect of low concentrations of the alums, Potassium chromium sulfate and potassium aluminum sulfate, and their constituents, potassium sulfate, aluminum sulfate and chromium III sulfate. The crystals of hydrated copper sulfate formed from cooling supersaturated solutions. The normal faces of hydrated copper sulfate crystals were present. Their Miller Indices were 001, 010, 100, 101, 110, and 110. A new very pronounced face appeared when the crystals formed in the presence of the potassium aluminum sulfate, the potassium chromium sulfate, potassium sulfate and the chromium III sulfate. The new face had Miller indices of 111.

TESTING THE EFFECTIVENESS OF A LOW CARBOHYDRATE DIET FOR ITS ABILITY TO CONTROL THE PHSICAL AND PHYSIOLOGICAL ASPECTS OF A HYPOGLYCEMIC.

Diana Lauck 129 Clinton Street Ravenna, Ohio 44266

Hypoglycemia is a condition in which a person has an overactive pancreas that produces too much insulin. If there is too much insulin being released into the blood stream, the blood sugar level drops below normal. The release of insulin into the blood stream depends on the blood glucose levels. This is known as hyperinsulinism.

The treatment for hypoglycemia is a low carbohydrate diet. The principle behind this is that if carbohydrates cause overproduction of insulin, then the alternative is to decrease the total amount of carbohydrates out of the hypoglycemic's diet. My project is to research this idea and see how effective the low carbohydrate diet really is.

There are two tests being used to evaluate the effectiveness of this diet. They are the glucose tolerance test and the health appraisal indicator. They will be used to evaluate the progress of the 25 hypoglycemics I am testing. They will be on a low carbohydrate diet for three months. They will receive each test three times during this study. At the end of the period of time, then the test scores will be evaluated

DEVELOPMENT OF ALTERNATIVE THERAPEUTICS TO CORTICOSTEROIDS IN THE TREATMENT OF ARTHRITIC DISEASE. Kelly McAleese, 47149 Bursley Road, Wellington, Ohio 44090

In the formulation of the most advantageous therapeutic treatment of arthritic disease, primarily rheumatoid arthritis, the corticosteroids are actively given over prolonged usage. But various adverse conditions and disorders reacting in many patients under this medication or its analogous synthetic derivatives may not only result in discomfort but can also trigger severe clinical symptoms (e.g., peptic ulcers, electrolyte imbalance, visual impairments, HPA axis degradation, gastro-intestinal bleeding, and edema).

Alternate therapeutics dealing primarily with the anti-inflammatory and analgesic response in guinea pigs and rats are investigated, and experimentation involves nonsteroidal anti-inflammatory agents. These have, as their major pharmacological effect, the reduction of edema, erythema, and resulting tissue damage associated with inflammatory conditions plus the added incentive of sharing the actions of analgesia and antipyresis. This triad of action includes series of prolonged treatments using salicylates.

Results indicate that the probable mode of action for NSAIA, that of inhibition of prostaglandin synthesis, does mediate in the prostaglandin cascade and is integral in the role of inflammation and normal physiological function. The data accumulated also includes the effect of NSAIA on platelet function and treatment of thrombosis, though these areas require further introspection and specific controlled investigation.

ENHANCEMENT OF PROTEIN SYNTHESIS IN VITRO BY NANDROLONE DECANOATE

Mark Myers, 14242 Reeder, Alliance, OH 44601

I have succeeded in culturing mouse spleen cells in a culture system similar to that used by Dr. Click et. al (1972). The only difference in media was my omission of 0.45 ml. of nucleic acid precursors. I am now determining the optimum concentration of Nandrolone Decanoate, a synthetic anabolic steriod, on the viability of the cells. Cell viability will be determined by the trypan blue dye exclusion test. After I have determined this optimum level, I will culture cells at that level in order to determine the effect of the steroid on the protein synthesis of the cells.

THE EFFECTS OF ASBESTOS ON MUTATION RATES IN DROSOPHILA MELANOGASTER. David Macko, 3775 Airport Hwy. Toledo, Ohio 43615.

Food concentrations of 10% and 20% refined industrial asbestos(chrysotile) were fed to Drosophila melanogaster to determine if it would effect mutation rates. In no cases were genetic mutations caused by asbestos feeding. Although in many cases there were detrimental effects in the reproductive ability of the adult flies, resulting in unbalanced ratios of males to females in the progeny. The reproductive ability of the progeny was also effected by the feeding of asbestos to their parents, in such a way as to also alter the expected ratio of males to females of their own progeny.

THE EFFECTIVENESS OF DEODORANTS

Laurie Penix, 246 Selden Avenue, Akron, Ohio 44301

Deodorants work as anti-bacterial agents to kill the bacteria which flourish in perspiration on the skin's surface and cause offensive body odor. Nine deodorants were tested: Ban, Ultra Ban, Rightguard, Mennen, Topco, Sure, Secret, Dial, and Dr. Scholl's Foot Deodorant. Blood agar plates were inoculated with Staphylococcus abus, an aerobic odorous bacteria which grows in a salty environment and is commonly found on the skin. Several filter paper discs, each saturated with one of the deodorants tested, were placed on the plates and incubated for 24 hours at 30°C. The effective deodorants, Rightguard, Mennen, and Dr. Scholl's, prevented bacterial growth in a zone approximately 3mm wide. The other deodorants had no effect upon the bacterial growth. The ineffective deodorants might still prevent body odor as anti-perspirants but they will not stop odorous bacterial growth.

St. Vincent-St. Mary High School, 15 North Maple Street, Akron, Ohio 44303
Sr. Denise Macko, Teacher - Mr. Christopher Hanley, Principal

Developmental Work in Processing Speech Data by Microcomputers

C. Robert Pearsall II
136 West Elm Street
Deshler, Ohio 43516

Research and development work in the area of electronic speech processing has been undertaken during the past two and one-half years. The aims of the project are to develop and test a potentially marketable telephone interface for the deaf and hearing-imraired. Although the goals of the research have yet to be realized, a great deal of important work has been done. A lot of the work has dealt with establishing models for system structure. The problem involves: 1) reducing the amount of extraneous information contained in the incoming speech signal by use of appropriate circuitry, 2) processing the signals by an algorithm which identifies and combines the speech sounds into conceptual units, and 3) displaying the analyzed speech sounds visually. By using bandpass filters to break down the speech signals and an 8085 microprocessor to apply processing algorithms, extensive work is being done to produce a working prototype system. Economic analysis is a major factor in this research and has produced data useful to hobbyists, industry, and research.

GENETIC TRANSFER OF DRUG RESISTANCE PLASMIDS

Carrie Rinker 6226 Waterloo Rd. Atwater Ohio 44201

The transfer of drug resistance in bacteria which have been treated with sub-theraputic levels of antibacterial agents was the foundation for my research. I have selected gram-negative rods for my experimentation because their drug resistance is easily transferred. The bacteria were isolated in cultures taken from cattle that were under antibacterial treatmant. The procedure consisted of a battery of standard diagnostic tests: lactose fermenting, gram staining, oxidase testing, indole testing, and finally resistance testing with erythromycin, penicillin, tetracycline, and chloramycetin. After I had isolated a pure strain, which was proven resistant to two or more antibacterials, I interbred the multi-resistance strain with another strain having a different resistance. If genetic transformation has occured, the offspring have an aquired resistance to all of the antibacterials involved.

THE EFFECTS NUTRITION HAS ON CANINE EPILEPSY

Scott Ruble, 3596 Jones Road, Diamond, Ohio 44412

Research into the neurological disease of Epilepsy in the canine will be conducted. Different brands of commercial dog foods will be analyzed according to content. What will be determined are the kinds of additives, preservatives, and chemcial impurities that are present. When some people consume foods with high concentrations of sugar, additives, preservatives, and stabilizers, they become hyperactive. Since many dog foods contain large amounts of chemical additives, hyperactivity can happen to dogs. An epileptic collie will be used in my experiment. Its reactions to a variety of dog foods will be carefully observed. It appears that there is a correlation between diet and epilepsy or hyperactivity. Other factors which cause epilepsy are hereditary influences, brain damage, and a lack of oxygen. My goal is to identify a link between diet and epileptic seizures and produce a dog food that will minimize the epileptic condition.

ACCUTIME SPOTWELDING SYSTEM
Rod Stebelton, 6155 Coonpath Road, Carroll, Ohio 43112

A nearby industrial plant needed a spot-weld timer that worked constantly and which could be easily changed or repaired. I used integrated circuits for the timing sequence and constructed the unit on several printed circuit boards which could be changed easily by removing the cover. It took several tests and retests on the unit to get it to function properly. Since I finished this timer, I have made at least six more of two different designs and I recently got an order for ten more. At first I had problems with most of the timers, but through various tests I have (mostly by myself and my own knowledge) tried, I now have all of the different types working. I don't forsee any problems with the next ten I have to build. These units are on high production machines. Some make over 3500 cycles each day. I am now in the process of building a miniature spotwelder to demonstrate how the timer works and show some basic principles of spotwelding.

CHANGES IN THE DENDRITE AXONS OF COENOBITA CLYPEATUS AS A RESULT OF CONDITIONING
Faith Tumeo, 9100 Nichols Lane, Johnstown, Ohio 43031

In prior experimentation, I have basically found that it is possible to modify the behavior patterns of the coenobita clypeatus, through a conditioning process. Using data from this and other experiments as a reference, I further investigated the brain and neurons of this specimen. In my research, my major concern was to determine if, after a conditioning process, crustaceans gained a significantly greater amount of dendrite axons on their neorons.

Three groups of coenobita clypeatus took part in the experimentation. Group I remained unconditioned, where as Groups II and III were subjected to a reward/punishment stimuli in a conditioning process. After six weeks the conditioning of Group II concluded, and after twelve weeks, Group III's conditioning terminated.

Disection and immediate removal of the nerve gangli followed. A number of neurons from each specimen's gangli were observed. If during the conditioning process, an accumulation of dendrite axons resulted, it could be shown statistically. The mean number of dendrite axons of Group III would be significantly different from the number on the neurons of Group II. Furthermore, the same relationship would be found between Group II and Group I, if an substantial accumulation resulted.

DEIONIZATION OF CHLOROPHYLL-A IN PHOTOTROPIC DESMIDIACEAE
Richard D. Vargo, 117 Kreiner Ave.
Akron, Ohio 44312

In the increasing use of nuclear power in the world today, we do not know all of its dangers and faults. In this research, it is my purpose to study and anaylze the reaction of green algae when exposed to gamma radiation. The main focus of this research is to study the ionizing reactions which take place when chlorophyll-a is exposed to varying amounts of gamma radiation. The green algae Micrasterias rotata was selected as the organism on which my research is based. By application of the Target Theory, which was proposed by Delbrook in the 1930's, (this theory was later expanded to include my research in algae) it was found that chlorophyll-a could be deactivated by four hits of radiation. A hit of radiation is where an ionization event occurs around a site which may lead to its deactivation. It was further theorized through this research that the possible hit targets may be the four nitrogen atoms which surround the central magnesium atom in the chlorophyll-a structure. By deactivating these targets through subsequent hits or radiation, it is theoretically possible to alter the structure of the chlorophyll-a molecule to such a degree to render it useless to the cell structure.

DEVELOPMENT OF A COMPUTERIZED VOICE FREQUENCY ANALYSIS SYSTEM

Carl Von Patterson, 7125 S.R. 88, Ravenna, Ohio 44266

The purpose of this research was to develop a new computer system method that would make possible detailed study of waveforms transformed into digital data. The data is unique in allowing for the analysis of individual frequencies rather than being limited to a broad bandwidth analysis. The research procedure involved the development of original algorithms and FORTRAN programs for a PDP 11/45 hybrid computer to perform frequency, amplitude, and time data analysis of output from a frequency domain spectrum analyzer. The programs were designed to digitally record, analyze, and plot the fast fourier transformed input of raw (unprocessed) frequency voltages, ie: voice. Several original equations were experimentally derived to determine spectrum analyzer output sampling rate for analog to digital conversion and for subsequent three dimentional analog plotting of the digatized data.

Application of this project will be in aiding research to help the deaf learn to recognize and pronounce words more easily. Formant frequencies of speech may be critically examined with this system for changes in intensities and distribution. Other potential applications include analyzation of: noise pollution, heart and respiratory sounds, stress patterns in manufactured equipment, and quality control of musical instruments.

THE EFFECT OF A STATIC ELECTRICAL FIELD ON THE GROWTH OF PEA PLANTS

Peter Wiley 648 Maple St. Perrysburg, OH 43551

The purpose of this research was to determine the influence of a static electric field on the growth of pea plants. It was hypothesized that increased growth would occur. The pea plants were grown between sheets of moist paper. There 15 plants to be electrified and 15 plants to act as controls. The electric field was produced by an electrostatic generator designed to produce a voltage of approximately 120, 000 volts. The field was carried to the plants by means of a grid of wires. The plants were electrified for 20 minutes each day for 11 days. The electrified plants were then compared with the control group. The electrified plants had longer stems, the same leaf size, lighter colored leaves, more but smaller roots. Further research is planned to make a comparative study of the peas produced by the electrified and unelectrified plants.

INTRASPECIES DOMINANCE OF BIRDS

Julie Wogaman 3229 Yankee Road Middletown Ohio 45042

Twelve species of birds were studied.These were the cardinal (Richmondena cardinalis), carolina chickadee (Parus carolinensis), downy woodpecker (Dryobates pubescens), english sparrow (Passer domesticus), grackle (Quiscalus quiscula), house wren (Troglodytes aedon), slate-colored junco (Junco hyemalis), mourning dove (Zenaidura macroura), song sparrow (Melospiza melodia), starling (Sturnus vulgaris), tree sparrow (Spizella arborea), and the white-throated sparrow (Zonotrichia albicollis). The birds were studied during three interacting periods. These periods were 1) a time during which little natural food is available to the birds, 2) the beginning of the breeding season and the establishment of territories, and 3) the return of the migratory birds. The birds were observed at four different feeding stations from one centrally located observation point. The feeding stations served all feeding levels and were located in various habitats. The information that was gathered indicated that there is no real dominance shown between the species of birds which were studied. Of the species that were studied, the only ones that showed any dominance were the cardinals and the downy woodpeckers. These two species were only dominant when certain conditions were present or only at certain stations. All of the species studied had a definite order of dominance within their own species.

O. ENGINEERING
AFTERNOON SESSION

ENGINEERING-SCIENCE 3003
RICHARD S. MAYER, PRESIDING

Section O will not meet in session except for a Business Meeting.
Papers will be presented in other sections.

1:30 p.m. Business Meeting

D. Medical Sciences

DIGITAL SIGNAL PROCESSING OF RETINAL RECEPTOR POTENTIALS TO STUDY VISUAL EFFECTS OF DRUGS. Ricardo Sanchez, J. M. Jagadeesh, H. C. Lee. See p. 42; 3:30 p.m.

ANALYSIS OF FIRST HEART SOUND AS RELATED TO CARDIOVASCULAR PARAMETERS. Herman R. Weed, Gerhard Vossius, K. Meyer-Waarden, H. L. Kwee. See p. 43; 4:00 p.m.

CYBERNETIC MONITORING VIA ADAPTIVE STATISTICAL FILTERING. Norman Kenneth Bodenstein. See p. 43; 4:15 p.m.

E. Physics & Astronomy

ENERGY USAGE ANALYSIS OF EXISTING BUILDINGS BY AN AUDIT METHOD. E. William Beans. See p. 47; 10:15 a.m.

F. Geography

A MODEL FOR GROUNDWATER QUALITY CONTROL IN IRRIGATED AGRICULTURE. Irfan A. Khan. See p. 48; 10:00 a.m.

H. Science Education

RESEARCH IN LAKE ERIE SHORE PROCESSES. Keith W. Bedford, Steven Dingman, Gary Lockwood. See p. 52; 9:00 a.m.

L. Math & Computer Sciences

SOFTWARE FOR DIGITAL TELEVISION. Subhash C. Kwatra, Chinnabbu Ekambaram. See p. 70; 9:00 a.m.

A MICROCOMPUTER SOFTWARE DEVELOPMENT FACILITY. Michael B. Stalker, Donald J. Ewing. See p. 70; 9:25 a.m.

A CONTINUOUS SYSTEM SIMULATION LANGUAGE FOR PERSONAL COMPUTERS. Donald J. Ewing. See p. 71; 10:15 a.m.

MATHEMATICAL AND EXPERIMENTAL MODELING OF THE STRESS DISTRIBUTION AT STIFFENED TUBULAR JOINTS. Adel Sadik. See p. 72; 2:20 p.m.

R. Ecology

CHROMATOGRAPHIC BEHAVIOR OF HUMIC MATERIALS EXTRACTED FROM BARBARTON SLUDGE. George P. Manos. See p. 93; 2:30 p.m.

P. ADMINISTRATIVE SCIENCES & PLANNING
MORNING SESSION

SNYDER MEMORIAL 216
EDWARD W. HANTEN, PRESIDING

PERSON-ENVIRONMENT CONGRUENCE FOR OLDER PERSONS AND HANDICAPPED ADULTS LIVING IN AN URBAN COMMUNITY SETTING. A. Bigot and F.J. Costa, Center for Urban Studies, The University of Akron, Akron, Ohio 44325

9:00

The increasing awareness of the need to consider the real environment as an important factor in the understanding of human behavior has long been acknowledged. Recognizing the importance of the environmental factor, both in terms of its physical and social substance has, however, only recently led to new theoretical and empirical approaches in studying the behavior of older persons and handicapped adults in institutional settings. In the present research, the authors have developed and will present a theoretical and empirical approach as to the roles of personal factors (P) and environmental factors (E) as they relate to behavior, adjustment, and life-satisfaction of older persons and handicapped adults living in an urban community setting. Data will be presented to indicate: (a) that there is a need to have new housing designed and/or existing dwellings modified relative to the functional competencies/behavior and personal preferences of older persons and handicapped adults; and (b) that environmental design should and can assist these individuals to maintain themselves in the community at various stages in their transition from independence to quasi- or complete dependence. The authors will comment on the generalizability of their approach, its application in other urban settings, and on policies encouraging its utilization by public housing aurhorities and planning agencies at the local, regional, and state levels.

HEALTH CARE COST-CONTAINMENT ASPECTS OF AN EMERGENCY ALARM RESPONSE SYSTEM FOR THE ELDERLY, Gary L. Cook, 55 Fir Hill Apt. 9c7 Akron, Ohio 44304

9:30

The Emergency Alarm Response System (E.A.R.S.)-Lifeline Program applies technology to the field of human services, with the resulting benefits being the increased physical and mental well-being of the isolated, vulnerable elderly adult, and the more efficient and effective use of the health care dollar in the local community.

The installation of a telephone emergency alarm and response system in the home of medically vulnerable older adults allows them to have access to emergency assistance at the touch of a wireless portable button, which can be carried on their person. In addition, the system contains a timer which, if not reset at least once a day, will automatically alert the response center, and an emergency responder will be dispatched to determine the situation.

This paper examines the service in terms of its benefits in the area of health care cost-containment. It assesses the need for the service in the community and demonstrates the actual effectiveness of the system. Included are specific case studies of emergency incidents which were successfully resolved with reduced complications, lessened severity, and consequently, reduced days of institutionalization. Also examined is the use of the E.A.R.S. system in conjunction with hospitals. This would allow appropriate patients to safely convalese at home rather than in the hospital, freeing much needed beds and reducing costs.

The program is discussed as an alternative to institutionalization (e.g. nursing homes), and a review of current funding with possible approaches for the future are presented.

VOTER CHOICE IN GOVERNMENT SPENDING: THE CHANGING PATTERNS
Frank B. Cliffe, 2446 Kenilworth Road, Cleveland Heights, OH 44106

10:00

Americans increasingly live and work in metropolitan areas which are economic and social systems, i.e., the parts are fairly well related to each other. However, those same metropolitan areas are neither governmental, political nor administrative systems. This disparity between political, governmental and administrative systems on the one hand and economic systems on the other may well be increasing. "Rational Cost-Cut Management" is difficult given these disparities. This paper presents data on the behavior of one key group of metropolitan decision makers: voters participating in referenda. This information may make possible better judgments about the probable consequences of submitting decisions to the referendum process. This study examines voter behavior in the Cleveland metropolitan area between 1910 and 1972.

A METHODOLOGY FOR USING A COMPREHENSIVE DATA SYSTEM FOR USE IN PLANNING AND SETTING POLICY AT ALL LEVELS OF GOVERNMENT. William Laurie and Thomas Walsh, 15787 Forest Hills Blvd., East Cleveland, Ohio 44112.

10:30

A methodology was developed to address broad policy issues for the aging society (people 65 years old and older in Cleveland, Ohio) using a longitudinal data system which included 5 levels of well being of 1,609 people with related social services from 130 agencies over a 2-year period. Using Markov prediction and transition matrix techniques, we were able to determine the effects of services on changes in well being and to project findings and related costs into the future.

The personal conditions of older people are measurable and dynamic. About one-third of the people were in the best overall condition. Over a 1-year period, 18 percent of the people improved and 18 percent worsened.

Many older people could benefit from expanded help. About 9 percent of the people could have been in a better condition in 1976 if they had been treated for all their illnesses between 1975 and 1976. We projected the conditions and problems of the 65-to 69-year-old age group for the next 20 years. For example, our projections show 11 percent more of the 65 to 69 age group would be experiencing a better illness situation in 1980 than if they had not received expanded help. Fourteen percent more would be experiencing a better situation in 1985, 14 percent more in 1990, and 12 percent more in 1995. This paper will demonstrate the power of these analytical tools in planning at local and national levels.

P. ADMINISTRATIVE SCIENCES & PLANNING

AFTERNOON SESSION

SNYDER MEMORIAL 216
EDWARD W. HANTEN, PRESIDING

1:00
Business
Meeting

"REORGANIZATION: COPING WITH LIMITED RESOURCES IN FEDERALLY FUNDED PROGRAMS."
Presented by: Ms. Jameela A. Afi, 15321 Plymouth Pl., E. Cleveland, Ohio 44112

1:30

The concept of reorganization can be threatening to present day public administrators, particularly those who are faced with current budgetary cuts, fiscal constraints and limited resources.

In order to promote effective cost-cut management in federally funded programs, one has to analyze the organizational structure that is being utilized in that particular organization. By analyzing such a structure, its current effectiveness will have to be determined. Oftentimes, this will entail modifying the current structure and challenging traditional administrative theory, in order to meet present day realities. It is my contention that ridgid organizational structures must be altered, in order to cope with dwindling resources.

In this paper, I discuss the concept of outside factors, (i. e., economic and political) effecting organizational change within the traditional realms of administrative theory; thus, alternative structures develop, which addresses the new demands being made on public administrators. As a result, the need for reorganization becomes necessary, in order for the organization to survive. The concepts of interdependence and the team approach is discussed as tools for coping with fiscal constraints and budgetary cuts. If we are to maintain viable organizations at optimal efficiency levels, these tools must be utilized.

PRIVATIZATION OF URBAN SERVICES
Mark J. Kasoff, Antioch College, Yellow Springs, OH, 45387

2:00

Increased financial stress on local government will occur in the 1980s. The forces of rapid inflation, declining local tax bases, taxpayer revolts, and increased demands for public goods are converging to challenge the traditional way cities do business. Improved financial management, greater public employee productivity, and service cutbacks are a few responses to these trends. This paper explores another approach - the "privatization" of public services. It starts with the assumption that local government should get out of the business of directly producing local services as much as possible. Various approaches to privatization are reviewed, such as contracting with private firms and harnessing urban volunteers to provide public services at the neighborhood level. A recent Gallup Poll indicated substantial citizen support for this approach. Specific cases of privatization in Scottsdale, Arizona and Ljubljana, Yugoslavia as well as other American and international examples will be presented.

WORK SCHEDULING AND PRODUCTIVITY IMPROVEMENT IN LOCAL GOVERNMENT: THE CASE OF PUBLIC SERVICE DELIVERY

2:30

John J. Kastellic, City of Akron, 166 S. High St., Rm. 105, Akron, OH 44308

The use of performance standards and work scheduling has many applications in local government service delivery. The use of these systems can result in improved service delivery, better timing of these services and potentially at a lower cost to the taxpayer. The City of Akron has used such systems in streets and parks maintenance.

These computer based information systems incorporate a workload inventory, activity performance standards and management objectives as to levels of service. These management information systems assist managers in resource allocation and budgetary decisions.

The purpose of this paper is to explore how the use of management information systems can improve public service productivity, to define a strategy for implementation and to identify obstacles to successful implementation.

MUNICIPAL BUDGETARY RESOURCE ALLOCATIONS DURING A LONG-TERM ECONOMIC CRISIS

William C. Binning and Terry F. Buss, Youngstown State University, Youngstown, Ohio 44555

3:00

In September, 1977, some 4,200 steelworkers lost their jobs due to the unforeseen permanent closing of several steel mills in the cities of Campbell and Struthers, Ohio. This calamitous event sent shock waves through the municipal budgetary systems and school districts of both cities because of anticipated and subsequent substantial loss of income tax revenue and property tax. This research focuses on the strategies adopted by the municipalities and school districts to cope with the loss. The strategies adopted included: (1) integration of the communities to form a common planning agency, to solicit funds from the state and federal government and to serve as a pass-thru agency for those funds; (2) short and long-run bedget strategies adopted by the municipalities and school districts; and (3) short and long-run strategies adopted to generate increased revenues.

PROPOSITION 13 - OHIO STYLE: LOCAL PROPERTY TAX EFFECT OF OHIO REVISED CODE 319.301 (A)

Yong Hyo Cho, The University of Akron, Akron, OH 44325

3:30

This paper will review the nature and the total revenue impact of Ohio Revised Code Section 319.301 (A) which was adopted in October, 1976. This legislation effectively freezes the level of property tax collection for operating purposes. In view of the continuous increase in assessed valuation of taxable property, the effect of this legislation amounts to a property tax cut every year as far as the operating component of the property tax levy is concerned. When the issue of inflation is brought into consideration, the revenue impact of this legislation is massive although it has not received the dramatic attention of national or local press as did Proposition 13 of California in 1978.

Q. ECONOMICS

MORNING SESSION

SNYDER MEMORIAL 116

RICHARD T. TALIAFERRO, PRESIDING

CHANGING PATTERNS IN INDUSTRIAL DEVELOPMENT BONDS IN OHIO, 1960-1975
Dr. Richard T. Taliaferro, 1620 Diplomat Drive, Dayton, Ohio 45432

10:00

As is well known, interest earned by investors on the debt of state and local governments is exempt from federal income taxes. Because of the tax exemption feature, state and local governments are able to borrow money at substantially lower interest rates than if interest were federally taxable. However, limitations have been imposed on the purposes for which tax-exempt securities could be issued, because of their growing use for industrial development and the general feeling in the U.S. Congress that such use was an inappropriate subsidy for capital investment. The State of Ohio, and many of its municipalities, of course, along with all other states have issued debt for industrial development purposes. As might be supposed, a primary objective for Ohio political jurisdictions in issuing debt of this sort has been to forestall the growing drift of industry to southern and western regions of the United States, and even to overcome the drift and possibly even attract additions to the industrial base. Industrial activity in Ohio is comprised of a wide range of individual industries. For the period 1960-1975, the composition of industrial activity underwent noticeable change. Industrial development bonds might be expected to reflect the way in which Ohio's industries were changing in that period. Surprisingly, research indicates little if any relationship between the two; nevertheless it does answer some questions on the efficacy of industrial development bonds.

10:30
Business
Meeting

R. ECOLOGY
FIRST MORNING SESSION

ENGINEERING-SCIENCE 2252
G. DENNIS COOKE AND VICTOR J. MAYER, PRESIDING

JOINT SYMPOSIUM
SPONSORED BY SECTION R, ECOLOGY AND SECTION H, SCIENCE EDUCATION

LAKE ERIE AS A RESOURCE AND THE ROLE OF THE OHIO SEA GRANT

SEE PAGE 52 FOR ABSTRACTS

R. ECOLOGY
SECOND MORNING SESSION

ENGINEERING-SCIENCE 2254
L. P. ORR, PRESIDING

APPLICATION OF SELF-THINNING AND CONSTANT FINAL YIELD MODELS TO AN OLD-FIELD PLANT COMMUNITY. Kent O. Starrett, Department of Biology, University of Toledo, Toledo, Ohio 43606.

8:30

An old-field plant community was studied to determine whether self-thinning (Yoda, et al., 1963) or constant final yield (Harper and White, 1970) models best described the results of competition for space. When mean plant weights and densities are compared negative regression coefficients will result from self-thinning and constant final yield model predictions. The constant final yield model predicts regression coefficients will change from zero to -1.0 through the growing season. Self-thinning predicts regression coefficients will approximate -1.5. Self-thinning occurred in Erigeron canadensis L. populations in July, 1977 and June, 1978. The prediction of the constant final yield model was met by the total plant community in July, 1977. In 1977 and 1978 the structure of the plant community changed due to the early maturity of smaller species and later maturation of the large dominants. Competition for space was concentrated during June and July when the plants were of equal size.

8:45 USE OF NEST BOXES TO STUDY BEHAVIORAL ECOLOGY OF WHITE-FOOTED MICE (PEROMYSCUS LEUCOPUS). A. Michelle Trudeau, Gale R. Haigh and Stephen H. Vessey, Department of Biological Sciences, Bowling Green State University, Bowling Green, OH 43403.

In spite of a plethora of trapping studies of white-footed mice, little is known of their social behavior as it relates to population dynamics. Nest boxes were used to supplement live-trapping as part of a seven-year demographic study in a two hectare oak-hickory woodlot in Wood County, Ohio. Made of weather-proof particleboard with sliding galvanized metal tops, the nest boxes measured 10.25 x 10.25 x 10.25 cm, with a 2.5 cm square opening in front. Cotton nestlets were added for bedding. In March, 1979, 91 boxes were hung from trees 1-1.5m above ground in a 7 x 13 point grid. During the weekly checks mice captured were sexed, weighed and ear-tagged if over 9 gm; smaller mice were toe-clipped. Results of the spring period (March-May) were too few to analyze (9 captures), possibly because the boxes were still new. During both summer and fall, more males were encountered in nestboxes than females ($P < .05$), with solitary males forming the most prevalent social unit ($P < .001$). Other groupings, listed in decreasing order of frequency, were: solitary females; females with litters; male-female pairs; litters with no adults present; large, mixed-sex groups of up to 11; males with litters; and male-male pairs. On three occasions we found communal nests, where more than one litter was present. Additional data are being collected on reproductive success of individual females and juvenile dispersal.

9:00 MORPHOLOGICAL AND GENETIC VARIATION BETWEEN STRIP MINE AND OLD FIELD POPULATIONS OF RUMEX ACETOSELLA L. (POLYGONACEAE). Michael A. Farris and Barbara A. Schaal, Department of Botany, The Ohio State University, Columbus, OH 43210.

Genetic variability and morphological differentiation were studied in populations of Rumex acetosella L., a perennial species commonly found on disturbed acidic soils. R. acetosella is a dioecious polyploid with high rates of asexual reproduction. Populations of Rumex acetosella were collected from unreclaimed strip mine tailings in Perry Co., OH, and from old field sites in Fairfield Co., OH. Morphological variation between populations was evident, with strip mine populations having a more compact growth form and different pigmentation than non-strip mine populations. Genetic variability within populations is evident for several different isozyme systems.

9:15 THE DEMOGRAPHIC CONSEQUENCES OF TWO-STAGE LIFE CYCLES. Wesley J. Leverich and Barbara A. Schaal, Department of City and Regional Planning and Department of Botany, The Ohio State University, Columbus, OH 43210.

The factors which influence the timing of reproduction and how the timing of reproduction affects fitness have been the subject of intensive investigation and speculation. Theoretical studies have concluded that early reproduction increases r, the intrinsic rate of increase, and thus, by definition, increases fitness. These conclusions are based on models of continuous population growth and may not pertain to species with life-histories which depart from continuous growth. Here we report a set of circumstances for organisms with annual life cycles, under which offspring produced later in the life cycle represent a greater contribution to subsequent generations, and we show that under these circumstances fitness is increased by delaying reproduction. Finally, we consider the evolution of the winter annual habit in plants which may be a consequence of these circumstances.

9:30 STRUCTURE OF AN ANNUAL PLANT COMMUNITY. Patrick S. Bourgeron, Barbara A. Schaal, and Wesley J. Leverich, Department of Botany, The Ohio State University, Columbus, OH 43210.

A unique and interesting type of plant community, rich in annual species, occurs on sandy soils throughout south and south-central Texas. This community is characterized by a mosaic of phases dominated by different annual plant species, and it occurs exclusively on sites with active disturbance by pocket gophers. These communities are highly disturbed, yet are stable and predictable on a year to year basis, and many of the plant species occuring in them are demographically specalized for this unique habitat. An analysis of community structure was undertaken to determine 1) spatial diversity and mosaic homogeneity, 2) species --habitat relationships, and 3) diversity patterns and niche overlap. Methods included gradient analysis and the calculation of indices of alpha and beta diversity, niche overlap, and patchiness. The results suggest that community structure is in many attributes related to gopher activities.

CHANGES IN COMMUNITY STRUCTURE IN SOUTH CAROLINA SECONDARY SUCCESSION. Patrick S. Bourgeron, Department of Botany, The Ohio State University, Columbus, OH 43210

9:45

Changes in plant diversity during succession were documented and characterized in the coastal plain near Georgetown, South Carolina. Four stands, of 28, 114, 145, and 183 years old, were studied on mesic stands. Richness diversity (S) and heterogeneity diversity (as expressed by $H'=-\Sigma p_i \log p_i$, and $\Delta_1=(N/N-1)(1-\lambda)$ were analyzed for the whole community and for three functional components (overstory species, understory species, and herb+vine species). It was observed that density of seedlings of overstory plants changes during succession symetrically with the density of the herb+vine species. These data support the findings of previous work involving competition of overstory species vs. non-overstory species. However, the outcome of this competition does not jeopardize the structure within each component, which should depend more on relationships between species than on relationships among groups. In this respect, stratal diversity can be considered as independent for each stratum.

FLUCTUATIONS IN TIME OF PAIR BONDING AND NEST BUILDING IN A COLONY OF CHIMNEY SWIFTS

10:00

Ralph W. Dexter, Dept. of Biological Sciences, Kent State University, Kent, Ohio 44242

In a sample of 171 cases of nesting pairs of the Chimney Swift (Chaetura pelagica L.) over a period of 20 years (1958-1977), 70 pairs were paired on arrival or when first observed (Range 0-11; aver. 3.5/yr.). In 101 other cases (59.1%) there was an interval of 1-19 (aver. 5.6) days before pair bonding. In 145 nestings over the same period of time, first nest of year was started May 12-26. Latest date for starting nest (regular nesting) was June 8. Latest date (unusual case) was July 3 (not counting replacement nests). Average date for starting nest was May 25 and required 6.94 days (aver.) for completion (range 2-14). Longest time required (unusual delay) was 23 days.

BIOENERGETICS OF THE GOLDEN MOUSE (OCHROTOMYS NUTTALLI) IN GROUPED AND UNGROUPED TREATMENTS. Scott D. Springer and Tricia A. Gregory, Institute of Environmental Sciences, Miami University, Oxford, OH 45056

10:15

The importance of social groupings on the bioenergetics of the golden mouse (Ochrotomys nuttalli) was measured and evaluated. For one week, twelve adult animals (six male, six female) were maintained in metabolism units; six units contained a single individual and two units contained three individuals each. The following week, animals previously maintained as individuals were caged collectively, and those previously in groups of three were caged individually. The diet consisted of sunflower seeds and water was provided ad libitum. Ingestion values for individually maintained animals (0.50 kcal g live wt^{-1} day^{-1}) were significantly higher ($P \leq .05$) than for those mice housed in groups of three (0.41 kcal g live wt^{-1} day^{-1}). Egestion values were not significantly different between treatments with a mean value of 0.02 kcal g live wt^{-1} day^{-1}. Individually maintained animals had significantly higher ($P \leq .05$) assimilation values than grouped individuals with mean values of 0.48 kcal g live wt^{-1} day^{-1} and 0.39 kcal g live wt^{-1} day^{-1}, respectively. Assimilation efficiencies, however, were similar: 96.2% for singly-housed individuals and 96.3% for those maintained in groups. Since no significant amount of energy was diverted into secondary production, assimilated energy approximated respiration. This suggests (a) that the grouped category maintained a lower metabolic level than individually caged animals and (b) that the occurrence of behavioral groupings in natural populations assists in energy conservation.

10:30
Business Meeting

R. ECOLOGY

FIRST AFTERNOON SESSION

ENGINEERING-SCIENCE 2256
BARBARA A. SCHAAL, PRESIDING

1:30 ARNOLDIELLA CONCOPHILA MILLER, A RARE ALGA OR MERELY OVERLOOKED? Dr. David Moore, Department of Biology, Utica College of Syracuse University, Utica, New York. 13502.

First described by V. Miller in 1928, Arnoldiella conchophila was described as forming dark green crusts on and substrate specific to the shells of the mollusks Anodonta and Unio in Lake Pereslaw in Central Russia. The occurrence of this alga is not specific to mollusk shells, but rather dictated by a physiological need for calcareous substrate. It is a component of shoreline algae of Lake Erie as noted by Rachael Cox Downing and a frequent component in the Trenton limestone seeps of Central New York State. Its apparent rarity may indeed be only a reflection of its easily overlooked thallus.

1:45 EFFECT OF HURRICANE BELLE (1976) ON SUBTIDAL MEIOBENTHOS IN DELAWARE BAY, USA. William D. Hummon and Wayne A. Evans, Dept. of Zoology and Microbiology, Ohio Univ., Athens, OH 45701 (and College of Marine Studies, Univ. of Delaware, Lewes).

Intensive sampling (22, 29 July) of a shallow sand bar (3.7 m depth) on The Shears, near the mouth of Delaware Bay, preceeded passage of the storm (9 August). Maximum wave heights during the storm reached 2 m. Three days later a third sample series was taken; like the others it consisted of three samples each from two grabs, a Shipek and a modified Smith-McIntyre, with six stratified random subsamples split into three depth fractions from each sample. Meiofauna from the 36 subsamples X 3 depths per series were narcotized with 6% $MgCl_2$, extracted by multiple decantation and fixed with 10% formalin and Rose Bengal. Animals were tallied to major taxon by multiple Sedgwick-Rafter cell counts.

Sediments were coarser following the storm, and were more poorly sorted with each successive series. Abundances of eight dominant meiofaunal taxa showed no consistent pattern. Total meiofauna decreased following the storm. However this observation appears an artifact based on interaction of individual taxa. Six non-arthropod taxa (Gastrotricha, Nematoda, Turbellaria, Archiannelida, Polychaeta, Rotifera) showed greatest abundances during the second series, while two arthropod taxa (Copepoda, Brachiura Larvae) showed greatest abundances during the first series. Based on other evidence it appears that the meiobenthos migrated deeper into the sediments during the storm, re-emerged during the three days before our third sampling series, and hence were not devastated by the storm surge.

We thank class members at the College of Marine Studies for contributions to the project.

2:00 ALGAL PHOTOHETEROTROPHIC UPTAKE OF GLUCOSE AND ACETATE IN THREE AQUATIC ENVIRONMENTS IN NORTHEASTERN OHIO. Elizabeth L. Buchanan, Department of Biological Sciences, Kent State University, Kent, OH 44242.

Photoheterotrophic uptake of small organic substrates by phytoplankton has been measured in an acid mine pond, a sphagnum bog and a culturally eutrophic lake in northeastern Ohio. Uptake of ^{3}H-glucose and ^{3}H-acetate in light and dark bottles was measured in situ. Greater uptake in the bottles exposed to light during the 2-4 hour incubation period was attributed to algal photoassimilation of the substrate. Photoheterotrophic activity was found in the surface waters of the sphagnum bog, at various depths in the eutrophic lake, but rarely in the acid mine impoundment. These results indicate that CO_2 and light limiting conditions in these lakes may be favorable for uptake of organic molecules by certain phytoplankton species.

OCCURRENCE AND FATE OF PHOSPHOMONOESTERS AND POLYPHOSPHATES IN FRESHWATER SYSTEMS. Robert T. Heath, Dept. of Biological Sciences, Kent State University, Kent, OH 44242.

2:15

Complex phosphorus compounds occurring in freshwater systems can be segregated into two functional groups according to the processes by which orthophosphate is released from them: (1)enzyme hydrolysis, or (2)ultraviolet irradiation. This study investigated whether all members of class 1 function alike, or conversely whether this class of compounds can be subdivided in terms of origin, fate and ecological significance. This class is comprised of phosphomonoesters (PME) and polyphosphates (poly-P) which are distinguished by the differential substrate specificity of calf intestinal mucosa alkaline phosphatase. At 10 mM Mg^{+2} only PME are hydrolyzed; at 0.1 mM Mg^{+2} both PME and poly-P are hydrolyzed. This procedure detected the occurrence of each subclass in a survey of the upper portion of the Cuyahoga River and in two eutrophic lakes (East and West Twin Lakes). PME predominated inputs from forested and marshy regions, poly-P predominated agricultural inputs. In lakes studied PME predominated in the springtime; poly-P predominated in the autumn. Adsorption kinetics of PME and poly-P compounds to aerobic sediments indicate that sediments can act as a major sink. Adsorption kinetics were biphasic and the rates of adsorption of various compounds increased as electrostatic charge density increased.

CHROMATOGRAPHIC BEHAVIOR OF HUMIC MATERIALS EXTRACTED FROM BARBERTON SLUDGE George P. Manos, University of Akron, 302 E. Buchtel Ave., Akron, Ohio 44325

2:30

Humic and fulvic acids extracted from alkali treated municipal sludge contains more higher molecular weight materials than that extracted from secondary wastewater effluent. The study indicates that higher molecular weight materials(greater than Mwt of 30,000)are more easily entrapped on the proteinaceous surface of the biomass, while the low Mwt fractions(less than Mwt 30,000)will be present in the liquid phase of sewage effluents. It can be expected that in an aerobic biological treatment process, degradation or deaggregation of humic material will occur, forming low molecular weight components while condensation or polymerization will take place simultaneously in the formation of high molecular weight humic acids. The lower molecular weight fulvic acids are more susceptible to be released into the liquid phase. This is in agreement with studies made of fulvic and humic acids in soil where humic acids are of a higher molecular weight than the fulvic acids. The ratio of E_4/E_6, the absorption of color bodies at 465 nm of wavelength has been used for the characterization of humic compounds found in soil. McLaren reported an E_4/E_6 ranging from 6.0 to 8.5 for fulvic acid while the ratio for humic acid ranges from 3.0 to 5.0. An increase in condensation will decrease the ratio for humic acid. The ratio for humic and fulvic acids extracted from raw sludge was found to be 8.3 and 13.0 respectively. In general progressive humification and increased condensation are indicated by a decrease in the E_4/E_6 so that the ratio could serve as an index of humification. Whether or not E_4/E_6 has much validity for fulvic acids requires further investigation.

A STUDY OF THE CHEMICAL AND PHYSICAL PARAMETERS OF A TEMPERATE HARDWATER SPRING IN JOHN BRYON STATE PARK, GREENE COUNTY, OHIO. Mark J. Butler IV, Department of Biology, Wittenberg University, Springfield, Ohio, 45501.

2:45

A limnological investigation beginning July 1979 was conducted on a cold hardwater spring in John Bryon State Park, Greene County, Ohio. "OZ Spring" is one of several small springs that issue from a dolomite (Cedarville Dolomite-Silurian Age) bluff above the south bank of Little Miami River. OZ Spring originates at an elevation of 280 meters and the effluent flows down a steep incline for approximately 100 meters before entering the river (ele. 267m). The spring supports extensive mats of water cress (Nasturtium officinale Glück) which provide a habitat and possible food source for populations of amphipods (Synurella dentata Hubricht) and isopods (Lirceus fontinalis Raf.). The substrate is composed generally of marl deposits, although some dolomite cobbles are present. Bimonthly sampling has shown the spring to be very constant both physically and chemically. Although air temperatures ranged from -4 to 35°C, the water temperature varied only 3°C. Oxygen saturation remained 80% and pH ranged from 7 to 8.1. Nitrate levels were consistently high (4-5 mg/l) as were conductivity (550-600 μmhos/cm) and methyl orange alkalinity (280-285 mg/l $CaCO_3$); phosphate levels rarely exceeded 0.1 mg/l. Community dynamics of the spring and its relationship to physical and chemical parameters are also discussed.

SURVEY OF TROPHIC STATE IN OHIO LAKES AND RESERVOIRS. G. Dennis Cooke and Robert E. Carlson, Department of Biological Sciences, Kent State University, Kent Ohio 44242

3:00

As part of a survey of Ohio lakes and reservoirs, the degree of eutrophication of 14 reservoirs and natural lakes in 3 northeastern counties was determined by using the Carlson Trophic State Index. Index values, based on total phosphorus concentration ranged from 39 in Stewart Lake (oligo-mesotrophic) to 73 (hyper-eutrophic) in Aurora Lake. Most lakes have an index value near 50, suggesting that protection or management could prevent them from becoming eutrophic. One lake changed trophic state from 63 (eutrophic) to 44 (mesotrophic) following sewage diversion and an in-lake restorative technique. This represents a change in average algal biomass of greater than 2-fold.

VARIATION IN LARVAL DENSITIES IN THE OHIO RIVER, MELDAHL POOL. Daniel S. Wagner, James B. Averill, and Michael C. Miller. Dept. of Biology, University of Cincinnati, 45421.

3:15

The larval fish population in the Ohio River was sampled weekly at six sites, April to August, 1976 to 1978, near Maysville, Kentucky. Data on the pattern and length of appearance of fish species coincides with the known life histories of these species. Total larval fish densities in 1976 were greater than in 1978 and 1977 respectively. In 1976, the highest mean density was 1382 larvae/100m^3 on June 11; 196/100m^3 on June 27, 1978; and 121/100m^3 on June 17, 1977. These highest density dates coincide with the first sample date where water temperature reached 25C or greater. The taxonomic composition of samples differed between 1976 and 1977. In 1976, the earliest collections were predominantly suckers (Catastomidae), comprising 76.7% of identifiable larvae from a total abundance of 15.4 larvae/100m^3. On all succeeding dates, over 80% of identifiable larvae were clupeids and/or minnows. Suckers were more predominant in 1977. In contrast, clupeid densities dropped a thousandful from 1976 to 1977. A model for estimating the total larval fish population in the area will be discussed.

R. ECOLOGY

SECOND AFTERNOON SESSION

ENGINEERING-SCIENCE 2254

DAVID A. EGLOFF, PRESIDING

THE SIZE-EFFICIENCY HYPOTHESIS: A DYNAMIC APPROACH. Gaugush, R. F. University of Warsaw, Warsaw, Poland and Kent State University, Kent, Ohio 44242.

1:30

The size-efficiency hypothesis (SEH) was formulated to explain the observed inverse relationship between the abundances of large and small bodied zooplankton in lakes. The SEH dealt only with adult body sizes and largely ignored the dynamics of both zooplankton resources and predators. Field observations and experiments have often conflicted with the SEH. Both competitive success of smaller bodied forms and coexistence in the absence of size-selective predation have been observed. To reconcile these findings with the SEH a detailed zooplankton model was constructed. Dynamic factors, such as population age structure and development, predation, fluctuations in the quantity and quality of resources, cyclomorphosis, and resource partitioning were examined for their influence on the size structure of a model zooplankton community. First instar size, temporal segregation, and food selection were of greatest importance in determining population success or failure.

CONTROL OF PERIPHYTON PRODUCTION IN MODEL STREAMS. Nadine Folino. Dept. of Biol. Sciences, University of Cincinnati, Cincinnati, Ohio 45221.

1:45

Preliminary experiments with model streams have attempted to evaluate their suitability as experimental analogs to natural systems. Periphyton community response has been tested for replicability between streams and responsiveness to environmental and biological variables. These six streams with recirculating water were used to study the effects of light, temperature, and nutrients on productivity and biomass of periphyton. Variation in phosphates (23, 92, 370 ug P/l) caused increased algal biomass and production in proportion to treatment. With temperature treatments of 19°C, 26°C and 31°C optimal growth and biomass were found at 26°C. Reduction of natural light from 90% to 52% caused a four fold decrease in periphyton biomass. Adding biological variables in the form of invertebrate scrapers, shedders, and collectors was the final step towards obtaining sufficient model complexity to allow comparison with natural streams.

PHYTOPLANKTON PRODUCTION IN EUTROPHIC MAUMEE BAY UNDER CONDITIONS OF HIGH TURBIDITY. John E. Myers, Department of Biology, The University of Toledo, Toledo, Ohio 43606.

2:00

Maumee Bay, a shallow eutrophic ecosystem situated at the western end of Lake Erie, receives high sediment loads from the Maumee River. During the spring diatom bloom in 1978 when turbidity was high (secchi depth 20cm.) twenty-four hour productivity studies were conducted to investigate light limitation of phytoplankton productivity. Utilizing the light-dark bottle method, BOD bottles were set at depth intervals to measure gross production and respiration throughout the water column. During the peak of the diatom bloom cumulative rates, from surface to bottom, of gross production (35-66mg $C \cdot l^{-1} \cdot day^{-1}$) were higher than cumulative rates of respiration (19-32 mg. $C \cdot l^{-1} \cdot day^{-1}$). Most gross production occured in the upper layers of the water column where light saturation was measured down to two secchi depths. Saturation at this low light intensity indicates shade adaptation which may have resulted from the algal community being mixed through the turbid water column.

HISTORICAL TRENDS IN THE WATER CHEMISTRY OF THE U.S. NEARSHORE ZONE OF LAKE ERIE'S CENTRAL BASIN. R. Peter Richards, Water Quality Laboratory, Heidelberg College, Tiffin, Ohio, 44883.

2:15

As part of the analysis of data gathered in the nearshore surveillance program during 1978 and 1979, we have restudied historical trends in the water chemistry of Lake Erie, for seven parameters for which an adequate historical data base exists. Our analysis indicates that five parameters, which were increasing steadily in concentration since 1900, have decreased since 1960 or have not increased above their 1960 levels. More detailed records for a Cleveland water intake station over the past decade document a significant rise in nitrate plus nitrite, a significant decrease in chloride, and no significant change in total phosphorus. This last result is in contradiction to the implications of a report widely circulated by the news media last October, which indicated that the Great Lakes' water quality was improving "much faster than scientists had expected".

THE RELATIONSHIP OF % MORTALITY OF FOUR SPECIES OF AQUATIC BIOTA FROM 96-HOUR SEDIMENT BIOASSAYS OF FIVE LAKE MICHIGAN HARBORS AND ELUTRIATE CHEMISTRY OF THE SEDIMENTS. Robert A. Hoke, Dept. of Biological Sciences, Bowling Green State University, Bowling Green, Ohio 43403 and Bayliss L. Prater, Aqua Tech Environmental Consultants, Inc., P.O. Box 76, Melmore, Ohio 44845.

2:30

During the summer and fall of 1977, sediment grab samples were collected from forty stations in five Lake Michigan harbors using a Standard Ponar dredge. Samples were split and a portion used as the substrate for 96-hour sediment bioassays using Pimephales promelas, Hexagenia limbata, Lirceus fontinalis, and Daphnia magna. The remaining portion of each sample was analyzed for fifteen elutriate chemistry parameters.

Elutriate chemistry data and % mortality data of the four test species were bivariately correlated. Of the sixty total correlations performed, four were significant ($N=40$, $r \cong 0.40$, $p \leq 0.05$). Release of chloride correlated with % mortality of P. promelas ($r=0.59$) and H. limbata ($r=0.40$). Percent mortality of H. limbata also correlated with release of ammonia ($r=0.44$) and nickel ($r=0.72$) during the elutriate test. The relationship of chloride release and % mortality of P. promelas may indicate a threshhold effect occurs at 41 mg/l release of chloride. Ammonia and nickel have been previously reported as toxic to aquatic biota. The present investigation indicates that a linear relationship accounts for ≅ 50% of the variance in the relationship between nickel release from the sediments and % mortality of H. limbata.

RESEARCH OPPORTUNITIES IN A FRESHWATER ESTUARINE SANCTUARY

David Klarer, Gene Wright, Dennis Anderson
Old Woman Creek Preserve, 2005 Cleveland Rd. East, Huron Ohio, 44839

2:45

The national estuarine sanctuaries program was established to preserve representative examples of these productive but rapidly disappearing coastal areas. Old Woman Creek National Estuarine Sanctuary is the first area so designated in the Great Lakes Biogeographic area. This sanctuary, one of the least disturbed areas along the southern shore of Lake Erie, encompasses 600 acres of wetlands, a barrier beach, a relic prairie, and upland forests. The sanctuary, as part of the Ohio Natural Areas Program, is available for educational and research activities. The long term management plan includes the construction of an on-site teaching and research facility. In addition to laboratory space, housing will also be available.

OBSERVATIONS ON THE MICROBIOLOGY OF MAUMEE BAY

J. C. Burnham[1], T. L. Kovacik[2], G. H. Gronau[1], and P. C. Fraleigh[3]
Medical College of Ohio[1], Toledo Pollution Control Agency[2], University of Toledo[3]

3:00

Maumee Bay located in Western Lake Erie was sampled at 21 evenly-distributed locations at 1 meter depth forthe years 1974 and 1977. Parameters were selected which would address the public health quality of the waters as well as those which would provide data on the impact of a 252 acre diked dredge disposal facility. The geometric means for all sites and all sampling data for 1974 and 1977 respectively are 1,460,000: 1,167,000 total bacteria; 2,200:8,600 total coliforms; 43:70 fecal coliform; 3:20 fecal streptococci; and 53:290 total yeasts. The higher levels in 1977 correlate with higher mean flow rates and a higher water level for the Maumee River. These characteristics coupled with the diked facility did appear to reduce the transport time of Maumee River water to various sites in the Bay, thereby causing a 22 and 44 percent increase in 1977 in fecal coliform levels in the channel and dike zones, respectively, over what was expected. Fortunately, the outer bay zone is consistent in its fecal coliform levels for both 1974 and 1977 and is very independent of Maumee River bacterial values. Using pre-1978 State of Ohio coliform standards for primary contact recreation, the dike zone and the channel zone were in violation for the early summer, late summer and early fall seasons. Using 1978 fecal coliform standards, all zones and seasons for Maumee Bay were satisfactory except for the samples taken at the river mouth and dike zone on 9/20/77 - a day which followed extensive rainfall. Symmap analysis of microbial parameters suggest bacterial water mixing south of the channel is reduced in 1977.

MAUMEE BAY, LAKE ERIE.

P.C. Fraleigh[1], T.L. Kovacik[2], E.L. Russell[2], J.C. Burnham[3], and G. H. Gronau[3]. Biology Dept., Univ. of Toledo, Toledo, OH 43606[1]; Toledo Pollution Control Agency, 26 Main St., Toledo, OH 43605[2], Medical College of Ohio, Toledo, OH 43699[3].

3:15

Maumee Bay is a small (40 km^2) shallow (1.5m) bay at the mouth of the relatively large Maumee River (mean annual discharge, 136 $m^3 \cdot sec^{-1}$). From a study involving biweekly sampling at 14 to 21 sites during most of the ice free periods of 1974 and 1977, Maumee Bay appeared to be a productive ecotone. Across Maumee Bay, from a site near the mouth of the Lower River to one in adjacent Lake Erie, the specific conductance of the water and concentrations of substances decreased about 50%, apparently due primarily to dilution of river water by lake water in the bay. For example, yearly mean specific conductance decreased from 465 $\mu mhos \cdot cm^{-1}$ to 257 in 1974 and from 515 to 294 in 1977, yearly mean chloride decreased from 38.2 mg $Cl \cdot l^{-1}$ to 16.8 in 1974 and from 44.9 to 21.8 in 1977, and yearly mean total phosphorus decreased from 166 $\mu g\ P \cdot l^{-1}$ to 80 in 1974 and from 200 to 100 in 1977. In contrast, yearly mean phytoplankton chlorophyll *a* standing crops were higher in the Bay [43 $\mu g.l^{-1}$ (1974) and 64 (1977)] than in either the Lower Maumee River [30(1974) and 32 (1977)] or adjacent Lake Erie [26(1974) and 47(1977)] and, in 1974, zooplankton standing crops (yearly mean numbers per 1: Rotifera -390, Cladocera - 80, Copepoda - 200) appeared to be greater than those of the open waters of Lake Erie. Apparently, as is typical of bay ecosystems, the mixing of river water and lake water in shallow Maumee Bay created an ecotone having relatively high productivity.

INFORMATION & LIBRARY SCIENCES

MORNING SESSION
SNYDER MEMORIAL 375
RONALD M. WATTERSON, PRESIDING

9:00 PROVIDING ON-DEMAND MEDICAL INFORMATION TO HEALTH-CARE PROFESSIONALS VIA SLOW-SCAN TECHNOLOGY. Melanie F. McGuire, University of Cincinnati Medical Center Libraries, 231 Bethesda Avenue, Cincinnati, Ohio, 45267. It is vital that health professionals have access to the latest medical information so that they may maintain a high standard of patient care. However, with the ever-increasing amount of new information bombarding these health professionals, it is virtually impossible for them to keep up with the latest developments in their fields. This problem is accentuated in rural areas where often the majority of a health professional's time is devoted to the actual provision of patient care, leaving little time for research and training. Because it is not economically feasible to provide major information resources and information searching services in each semi-rural and suburban hospital, the most realistic approach is to make the existing resources of a larger well-equipped facility available to the practitioners there. Slow-scan technology can provide a practical means of linking centralized resources and the health professionals in outlying areas, allowing them to receive, in minutes, answers to medical questions which otherwise might take them several days to locate. A slow-scan telecommunications system uses voice-grade telephone lines to establish both an audio and still video link between the resource center and receiving sites. Slow-scan has the potential to radiate medical information from any health center, thereby linking major information resources and searching methods with health-care professionals in isolated areas. The utilization of a slow-scan system could have a direct and positive impact in improving the quality of care in the health-care system.

9:20 ADVANTAGES OF AN AUTOMATED ON-LINE CATALOG AND CIRCULATION SYSTEM IN AN ACADEMIC ENVIRONMENT. Elizabeth J. Sawyers, Health Sciences Library, The Ohio State University, Columbus, Ohio 43210.

The Ohio State University Libraries installed an on-line circulation system in the early 1970's. This system contains identification, location and status information for the approximately one and one half million titles held by the University Library System. In 1977, the system was augmented with holdings information for the journal titles received by the libraries on campus, and in 1978, full bibliographic information for all newly acquired titles was added. This paper describes the system's present capabilities, outlines planned enhancements, and discusses the advantages which such a system provides to an academic community, particularly in a multidisciplinary scientific environment.

9:50 ONLINE SERVICES COST STUDY Susan Shelly Anthony
University of Cincinnati Medical Center Libraries, 231 Bethesda Avenue, Cincinnati, Ohio 45267

The University of Cincinnati Medical Center Libraries' online reference services cost study has aided in recovering direct costs from patrons. All online services costs for the MEDLINE database were enumerated and categorized into either direct or indirect costs. Direct costs per search were calculated using a microcosting system; indirect costs were figured per month as macrocosts. Results indicated that each MEDLINE search performed costs the Medical Center Libraries approximately twelve dollars ($12.00). Seventy-one percent (71%) is for direct production and personnel costs and twenty-nine percent (29%) for indirect expenses (search training, supplies, administrative costs, etc.).

This study enabled the Medical Center Libraries to review its charges for online searching to all patron groups and to determine to what extent online services for each group should be supported by the library. The library is continuing to charge all patrons for the direct production costs of searching, but has also instituted a surcharge on all searches for non-primary patrons. The $6.50 surcharge is based on the cost study results and enables the Medical Center Libraries to fully recover its expenses for providing online services to its non-primary patrons.

The cost study will be updated annually, thus, enabling periodic review of the charging structure for online services.

COMPUTERIZED LITERATURE SEARCHING IN OHIO ACADEMIC LIBRARIES AT THE TURN OF THE DECADE Kathleen J. Voigt, William S. Carlson Library, University of Toledo, Toledo, Ohio 43606

10:20

A survey of the academic libraries in the state of Ohio to provide a state of the art description of the multifaceted aspects of computerized literature searching services at the turn of the decade.

MEDLINE DATABASE SEARCHING COSTS: NLM VS. BRS. Harris, Cheryl L., Yunag, Monica, M. and Putney, R. Taylor, Jr. Wright State University Health Sciences Library, Dayton, Ohio 45435.

10:40

A study comparing the on-line costs incurred in compiling bibliographies on the MEDLINE database accessed through Bibliographic Retrieval Services (BRS) Inc., and the National Library of Medicine (NLM) is presented. MEDLINE (Medlars on-Line) is one of the computer-based on-line information retrieval systems in clinical medicine and biomedical research developed by the National Library of Medicine. In January of 1977, this database also became available on-line from BRS, a commercial vendor. This study will focus on differences in system features and capabilities as well as current pricing structures. The results of this study should help administrators determine which system will be the most cost-efficient for their institution.

INFORMATION & LIBRARY SCIENCES

AFTERNOON SESSION

SNYDER MEMORIAL 375
ELIZABETH J. SAWYERS, PRESIDING

HISTORICAL DEVELOPMENT OF THE UNIVERSITY OF TOLEDO LIBRARIES Ina J. Weis, William S. Carlson Library, University of Toledo, Toledo, Ohio 43606

1:30

This research project is concerned with the collection of information from various sources for the purpose of writing a history of the University of Toledo Libraries. The history describes the development of the Libraries from the earliest to the present including the administration and contributions of four librarians, the first Mellie Smith (1917-1921), Mary M. Gillham (1921-1969), Patrick T. Barkey (1967-1974) and Leslie W. Sheridan, 1975 to the present.

THE MEDICAL LIBRARY: FROM GENERAL STORE TO SUPERMARKET
Charles A. Isetts, Ph.D., University of Cincinnati, Medical Center Libraries, 231 Bethesda Avenue, Cincinnati, Ohio 45267

1:50

Until the Second World War, medical libraries were in many ways similar to the old fashioned general store. On the shelves were a general selection of items users might need. The librarians neatly arranged the books and journals on the shelves and acted as store-clerks helping customers. The users remained happy if the shelves were clean, the library quiet, and the material where it was supposed to be. Librarians and users alike defined the library as a place to store books.

The medical library of today still stores books, but current librarians no longer define their function as custodians of the collection. They correctly see themselves as information specialists and their libraries as places to find information. It is the information, rather than the book, which is of primary importance.

In the near future even that conception of a library will no longer be adequate. As the need for information grows, the library must change from a place where people come to find information, to a place that actively distributes information. Future librarians will identify and transmit information where it is needed, to the home, to the office, to the laboratory or anywhere a user needs it. As the supermarket replaced the country store, the information center has replaced the traditional library and as technology develops, today's library may soon, itself, become a relic of the past.

COMPARATIVE ASPECTS OF MAP COLLECTIONS IN OHIO G. Robert McLean, William S. Carlson Library, University of Toledo, Toledo, Ohio 43606

2:05

A cross-analysis of map collections held in twenty-six university, special and public libraries in Ohio, to provide awareness of cartography as a medium of communication and information on the availability of cartographic materials within the state.

Business Meeting 2:30

POSTER SESSIONS

LOBBY OF ENGINEERING-SCIENCE

THE ROLE OF IMMUNE NEPHRITIS IN HYPERTENSION IN RATS. D.R. Mattie and P.K. Bajpai. Department of Biology, University of Dayton, Dayton, OH 45469

9:00

To study the effect of autologous anti-kidney antibody on blood pressure, kidney function and kidney viability, rats were actively immunized with homolous kidney cortex extract in Freund's adjuvant and with Freund's adjuvant alone for 24 weeks. Anti-rat kidney cortex antibody was detected in circulation of rats injected with kidney cortex extract after 18 weeks of immunization. Blood pressure, heart rate and respiration rate were normal in animals with circulating antibody and in control animals. Immunization of rats with kidney cortex antigens had no significant effect on the specific gravity and protein content of excreted urine. Total amount of oxygen consumed by renal slices obtained from rats immunized with kidney cortex antigens in Freund's adjuvant did not differ significantly from the total amount of oxygen consumed by renal slices obtained from rats immunized with Freund's adjuvant alone. The data collected in this investigation shows that, although the titer of the anti-rat kidney antibodies increased from 100 hemagglutination units in the 18th week of immunization to 1200 hemagglutination units in the 24th week of immunization, the amount of antibody produced was not sufficient to alter the physiological parameters dependent on renal function and kidney viability.

EFFECTS OF MATERNAL STEROID ADMINISTRATION ON PLACENTAL AND FETAL DEVELOPMENT IN THE RAT. Martha Hoppes, Jane Scott and David Garvey, Department of Anatomy, Wright State University, Dayton, Ohio 45435.

9:00

To investigate the effects of high levels of adrenal glucocortical steroids on fetal development timed-pregnant Long-Evans rats were given dexamethasone in drinking water (5 μg/ml) for the last six days (group 1) or three days (group 2) of gestation. The pregnant animals were sacrificed on day 21 of gestation; fetuses were removed and weighed; placentas were removed, weighed, and DNA, RNA and protein levels determined. Random placentas were fixed for light microscopy.

The average body weight of the dexamethasone-exposed fetuses was much lower than control fetuses (group 1 and group 2 rats weighed 39% and 22% less than controls, respectively). The average placenta weights for the respective groups were 31% and 13% less than control values. Histologically, the placentas of the dexamethasone-treated rats appeared to contain more glycogen and larger maternal blood spaces than control placentas. Some animals treated with dexamethasone were allowed to carry their fetuses to term (22 days and beyond). These aminals did not deliver their litters naturally. When delivered by Caesarian section on day 23 of gestation, most of the post-mature fetuses were dead. The results indicate that steroid treatment which mimics stress during pregnancy can have pronounced effects on gestation, and fetal and placental development.

DISTRIBUTION OF SUBSTANCE-P (SP), METHIONINE-ENKEPHALIN (ENK) AND SOMATOSTATIN (SOM) IMMUNOREACTIVITIES IN THE SPINAL CORD OF THE DOMESTIC FOWL. Antionette LaValley and R.H. Ho, Dept. Anat., Sch. Med., The Ohio State University, Columbus, O., 43210.

9:00

The indirect antibody peroxidase-anti-peroxidase method of Sternberger was used to study the distribution of SP, ENK and SOM immunoreactive elements in the spinal cord of the domestic fowl, Gallus domesticus. Immunohistochemical processing was done on 10μm sections of spinal cords that were fixed by intracardiac perfusion with Bouins fluid. Immunoreactivities for all three peptides could be localized in the gray matter. SP immunoreactive elements were numerous in the dorsal horn where they were densest in the substantia gelatinosa and reticular processes. In contrast the ventral horn and the area around the central canal exhibited sparse staining. The distribution of ENK immunoreactive elements was similar to that just described for SP. However, ENK immunoreactivity was most prominent around the central canal, within the intermediate gray area, and the ventral horn. A few SOM immunoreactive elements were present in the substantia gelatinosa, lamina X, and the ventral horn. The specificity of immunostaining was established in control experiments in which the primary antiserum for each peptide, pretreated with an excess of the corresponding synthetic antigen, failed to demonstrate the aforementioned structures on adjacent sections. We conclude that SP, ENK and SOM immunoreactivities are present in the domestic fowl spinal cord. (Supported by the Snyder Fund, the Graduate School and the Department of Anatomy, The Ohio State University.)

ULTRASTRUCTURAL OBSERVATIONS OF THE INFLUENCE OF FLUORIDE INGESTION ON THE PARATHYROID GLAND OF THE RAT. Ream, L.J. and R. Principato, Department of Anatomy, Wright State University School of Medicine, Dayton, Ohio 45431.

9:00

In addition to the documented action of fluoride on bone, there is evidence for hyperfunction of the parathyroid glands in skeletal fluorosis. To investigate this, rats were given 150 ppm fluoride in the drinking water for 10 weeks. The ultrastructure of the parathyroid glands from these animals were then studied and compared to the parathyroid glands of untreated control rats. In control rats, the majority of the parenchymal cells were light chief cells with low cytoplasmic density and relatively straight cell membranes. The Golgi complex and rough endoplasmic reticulum were inconspicuous. Secretory granules were sparsely represented. In contrast, the majority of the parenchymal cells of the fluoride-treated rats were dark chief cells which exhibited well-developed cytoplasmic organelles and numerous interdigitations among neighboring cells. Multiple, large Golgi complexes associated with numerous vesicles and granules were observed. The rough endoplasmic reticulum consisted of large lamellar arrays; polyribosomes were aggregated into spiral clusters. Increased numbers of secretory granules were observed within the cytoplasm of the dark chief cells, within cytoplasmic projections of the chief cells in perivascular spaces, and within the capillary endothelial cells. Based on these ultrastructural observations it is suggested that, as a result of fluoride ingestion and its effect on bone, a type of secondary hyperparathyroidism developed with increased production of parathyroid hormone in order to maintain the normal serum calcium concentration.

THE EFFECT OF FETAL HYPOXIA FROM MATERNAL CARBON MONOXIDE EXPOSURES ON POSTNATAL REINFORCEMENT LEARNING.

9:00

Fernando Perez (sponsor J.M. Ramsey), Biology Department, University of Dayton, Dayton, Ohio 45469.

Three pregnant Sprague-Dawley rats were subjected to an exposure chamber of air only for 5 hrs/day during gestation (21 days). Three additional pregnant rats were subjected in the same way except that the chamber was perfused with 250 ppm carbon monoxide. This degree of exposure resulted in an average 15.5% carboxyhemoglobin, and a corresponding reduction in venous oxygen tension of about 22 torr.

When the 64 rats were born (10-11 per litter) they were kept with their mothers until weaning, after which they were subjected individually to a RTC-021 rodent test cage designed to evaluate reinforcement learning. The 32 young rats whose mothers had been exposed to carbon monoxide showed a highly significant mean decrement in time required to produce effective responses ($P = < 0.0001$).

ARE CARDIOVASCULAR PARAMETERS RETURNED TO NORMOTENSIVE LEVELS WHEN BLOOD PRESSURE IS REDUCED IN TREATMENT OF HYPERTENSION? B.Doerr, E.L.Stanley, P.Kezdi, and M.A.B. Frey, Dept. of Physiology and Cox Heart Institute, Wright State Univ., Dayton, Ohio 45435

10:00

Noninvasive cardiovascular assessment of 6 normotensive (N) and 7 hypertensive (H, resting seated diastolic pressure RDBP>90mmHg) middle-aged males has previously revealed significant differences in resting pre-ejection period (PEP, H>N), PEP/left ventricular ejection time (PEP/LVET, H>N), stroke volume by impedance cardiography (SV, N>H), total peripheral resistance (TPR, H>N), and pulse wave velocity from second heart sound to dicrotic notch of carotid (PWV, H>N). There were no differences in heart rate (HR) or cardiac output (CO). In the present investigation a group of 5 middle-aged males under Step II treatment for their hypertension (T) with RDBP<90mmHg were studied using similar techniques to determine whether cardiovascular variables are returned to N levels when RDBP is reduced. Data are Mean + S.D.

	RDBP mmHg	PEP msec	PEP/LVET %	SV ml	TPR mmHg/L/min	PWV m/sec	HR bpm	CO L/min
N	77±6	111±16	.434±.07	62±16	21.5±5.7	8±4	75±11	4.8±1.9
H	97±6*	124±12*	.521±.08*	51±15*	30.2±8.6*	14±3*	78±10	4.0±1.0
T	84±4*	113±13	.427±.04	44± 7*	36.1±7.3*	10±3	66±06*	3.0±0.5*

*different from N at $\bar{p}<0.05$, t-test

These results indicate that the alterations of PEP, PEP/LVET, and PWV in H may be normalized even when RDBP is lowered by reducing CO while TPR is further elevated. (Supported in part by Miami Valley Chapter, AHA and NHLBI Hypertension in the Young Program #R01-HL19931.)

A GRADED MENTAL ARITHMETIC TASK FOR MONITORING PHYSIOLOGICAL EFFECTS OF TASK DIFFICULTY AND DURATION. R.F. Golden, R.W. Gotshall, and M.A.B Frey, Dept. of Physiology, Wright State University, Dayton, Ohio. 45435

10:00

A graded mental task has been developed which will induce increasing levels of "stress." The task consists of 3 levels of addition problems, each level consisting of 15 problems, delivered by a tape recording. The problems are mentally performed by the subject, who places only the answer on the provided form. The levels of addition problems are presented in order of increasing difficulty, which is determined by the difficulty of the 15 problems within each level. The difficulty of the problems was determined in preliminary studies in which the time for mentally completing each of 63 addition problems, verbally administered to 10 subjects, was measured. From the preliminary study, 15 problems for which the average completion time was < 5 sec were placed in Level I; 15 problems for which the average completion time was from 5-10 sec were placed in Level II; and 15 problems for which the average completion time was > 10 sec were placed in Level III. These selected problems were recorded on tape. The duration of each level is 2 min, a problem presented every 8 sec, with a 5 min rest period between each level. This stressor allows for measuring the changes in physiological parameters associated with the difficulty of the task and/or the duration of the stressor and has been successfully used to determine the effects of difficulty of task and duration of the stress on the cardiovascular system. (Supported in part by Miami Valley Chapter of the American Heart Association.)

STEREO-ELECTRON MICROSCOPY OF THE SURFACE OF HASSTILESIA TRICOLOR (TREMATODA: BRACHYLAIMIDAE). John L. Crites and Reid Jilek. Department of Zoology and CLEAR, The Ohio State University, Columbus, Ohio 43210.

10:00

H. tricolor was present in 65% of 168 rabbits examined from 6 counties in Ohio. Numbers present ranged from 92 to more than 3000 per rabbit. Trematodes of the Family Brachylaimidae may be spinous or nonspinous, some genera, Leucochloridium, Postharmostomum, and Brachylaima may adhere tightly to walls of their tissue sites by their suckers. Contrary to Hensler who, in 1959, reported H. tricolor was usually found free in the lumen of the rabbit intestine, we found this trematode in the layer of mucous adhering to the lining of the duodenum or between the villi with the spinous portion of the body in contact with the mucosa. This led us to examine the tegumentary spination more carefully utilizing SEM. Spines on ventral surface extend 80-87% of body length from anterior end. Posterior 13-20% of body is spineless and there are no spines near posterior terminal excretory pore. Spines extend continuously over anterior end and around lateral surfaces to dorsal surface. On dorsal surface only anterior 54-60% of body tegument is spinous. Spines on ventral surface range from sharp to bluntly pointed but on dorsal surface they become more flattened and scale-like. In region of oral and ventral suckers spines become reduced, rounded and papilla-like, some extend onto suckers. Spines surrounding genital pore in posterior third of body are not reduced. (Supported in part by NSF grant DEB 76-01414)

SURGICAL TRANSPLANTATION OF INTESTINAL NEMATODES AND ITS IMPLICATIONS IN THE STUDY OF NEMATODE CUTICLE REGENERATION. Reid Jilek and John L. Crites, Department of Zoology and the Center for Lake Erie Area Research, The Ohio State University, Columbus, Ohio 43210.

10:00

A surgical procedure has been developed whereby one may introduce and remove intestinal parasites. The basic design is merely a hollow "T" tube which can be inserted and secured in the intestinal luman. The parasites are introduced through the section of the "T" tube projecting out of the intestinal wall. Once the parasites are introduced the exposed portion of the tube is capped shut to eliminate intraperitoneal infections. Parasites may then be removed by an aspirator. The procedure requires 30 to 60 minutes initially to insert and secure the "T" tube. Subsequent surgical procedures to remove previously inserted parasites takes approximately 20 minutes. Minimal surgical experience is required. The surgical removal and introduction of parasites may be performed several times on a given animal at 3-4 week intervals. This procedure lends itself to various experiments. One of the experiments performed by our lab was to evaluate cuticle regeneration. Two trichostrogyle species were used, Trichostrongylus affinis and Nematodirus leporis. The cuticular sections of the bursas not including the rays of each worm were severed. The worms were reintroduced into the duodenal region of the rabbit definitive hosts. Worms were recovered 3 weeks and 7 weeks post-infection. The worms were then examined by light and scanning electron microscopy. No evidence of cuticle regeneration was observed.

LARVAL DEVELOPMENT OF THE NORTHERN MOTTLED SCULPIN (*Cottus bairdi kumlieni*) FROM THE CENTRAL BASIN OF LAKE ERIE. Denise Ann Hatala, Environmental Resource Associates, 20700 North Park Blvd., Cleveland, Ohio, 44118.

10:00

Ichthyoplankton collections from an area in Lake Erie approximately 1.5 miles east of Conneaut Harbor began in mid-April, 1979 and continued at 3 to 5 day intervals through August, 1979. The first sculpins appeared on 27 May and the last were collected on 26 June, with the greatest abundance on 2 June. A total of 1019 specimens were collected, most from depths of 8 - 10ft over rocky substrates. The size range of specimens collected was 6.50 - 18.0mm. Larvae hatched in a very advanced stage of development with moderately developed pectorals, and ray elements present on all fins except the pelvics. Midway through yolk absorption the saddle-bar pigmentation began to appear and shortly thereafter characteristics of the adult were obtained. Although the characteristics of the larvae contained in our collections are inconsistant with previously published accounts of field collected larvae assigned to this subspecies, evidence such as spawning date, detailed morphological and meristic observations of the juvenile portion of the series, and the presence of only this subspecies in the sample area indicates that this larval series represents the early development of *Cottus bairdi kumlieni*.

AQUATIC MACROPHYTES FOUND IN TEN PUBLICLY-OWNED N.E. OHIO LAKES. David J. Stroup and John L. Frola, Department of Biology, The University of Akron, Akron, OH 44325.

1:30

The species composition and the relative abundance of aquatic vascular plants were determined for ten selected publicly-owned lakes of Northeastern Ohio. These included Aquilla Lake, Baldwin Lake, Findley Lake, Hinckley Lake, Muddy Lake, Lower Shaker Lake, Upper Shaker Lake, Spencer Lake, Virginia Kendall Lake, and Wallace Lake. The ten designated lakes were each divided into several plant communities based primarily on the size of the lake and the number of plants observed. Random samples of each community were obtained, paying particular attention to the various levels at which growth takes place (i.e., emergent, floating and submerged). After identification of the collected material, plant community maps were constructed using accepted symbols to indicate the various species. Shallow lakes with irregular shorelines, creating bogs and lagoons, such as Hinckley Lake, tend to be overcrowded with vascular plants. Ceratophyllum was abundant in this lake. Muddy Lake is the deepest lake of the group with Myriophyllum and Potamogeton being represented. Virginia Kendall Lake is fed by salt run creek and some salt springs which is devastating to the vascular plants which accounts for the small number of species present.

CYTOKININ METABOLISM. D.F. Blaydes, W. Pietraface, W. Wooddell and A. Rodriguez. Dept. of Biology, West Virginia University, Morgantown, WV 26506

1:30

The activity and metabolism of 9 masked cytokinins are important aspects of research on the mode of action of cytokinins.

We have explored the activity of the 9 masked cytokinins in a number of systems, and the metabolism of the same cytokinins in several systems. In one case, Lactuca sativa (Achene) germination, we have some evidence that the 9 masking methyl group is removed and a cytokinin nucleotide is formed; however, in other systems the 9 masking agent is quite stable and nucleotide (or nucleoside) formation does not appear to be necessary for activity of the hormone.

Apart from the 9 masking studies is the work by Chen and colleagues on the enzymes of cytokinin metabolism, primarily in the non-cytokinin requiring strains of tobacco tissue cultures.

We will propose a scheme of metabolism of cytokinins associated with development that takes into consideration both enzymological studies and our 9 masking work.

Supported inpart by grants from American Cancer Society, Sigma Xi and W.V.U. Foundation.

ESTABLISHMENT OF PRAIRIE VEGETATION FROM LOCAL ECOTYPES IN MARION COUNTY, OHIO. Larry R. Yoder, The Ohio State University, Marion Campus, Marion, Ohio 43302.

1:30

One of the major areas of disjunct tallgrass prairie in Ohio was in Marion County. Virgin tallgrass prairie, previously extensive in the county, is now restricted to a few railroad and roadside rights-of-way which continue to be endangered by spraying and further development. A prairie is presently being reconstructed on the Marion Campus using seeds from the Claridon Prairie, a railroad prairie rich in forbs and grasses. Sorghum-Sudangrass hybrid (Sorghum bicolor sudanensis) has been used as a holding cover and preseeding mulch. Sudangrass is planted July 1 and the resulting vegetation is finely chopped and shallowly disked into the soil after frost. This serves as mulch for prairie seeds which are collected and fall seeded on the prepared seedbed. This procedure has successfully provided natural stratification and eliminated requirements for seed storage and stratification facilities. High mowing (30 cm) is used during the first growing season followed by annual spring firing and hand weeding during subsequent years. This procedure is successful in north central Ohio for establishment of prairie with a minimum of hand labor and storage capacity.

GENERAL ADVANCED MATHEMATICS. David Ryan 529 Adeline Ave. Vandalia, Ohio 45377

1:30

General Advanced Mathematics has been written for the purpose of providing an easier way to the self-teaching of advanced engineering mathematics. This paper has been organized in a form that lets the reader teach himself the math a section at a time. If one has forgotten it, he can look it up and put the topic in his memory. The paper combines the style of a textbook with the efficiency and the practicallity of a mathematical handbook. This paper covers much more material than is found in a regular textbook; it covers almost every aspect of advanced engineering mathematics that would be encountered by a scientist. The course of this paper is divided into eight major parts (Matrix Algebra, Ordinary Differential Equations, Vector Analysis, Advanced Calculus, Differential Geometry, Complex Analysis, Operational Calculus, and Partial Differential Equations and Boundary Value Problems). A prologue that occupies the first 56 pages is included to review the basic skills of algebra and elementary calculus. The appendix includes a section on Variational Calculus; tables on Derivatives, Integrals, Laplace and Fourier Transforms, Conformal Mapping, and the Higher Functions are also included. The eight major parts are divided into four chapters each (Complex Analysis has five and Advanced Calculus has six). These are further divided into articles which cover each topic. After the table of contents, there is something called the structure; this lists all of the 355 articles chapter by chapter and serves as a handy index to the body of the entire paper.

THE EFFECTS OF MOUTHWASHES ON MOUTH BACTERIA Tim Moats R.R. #5 Bryan,Ohio

1:30

My interest in the field of dentistry inspired me to experiment with the mouth in some way. I decided to test the elimination of oral bacteria by means of a mouthwash. I tested and compared the results of Cepacol mouthwash, Listerine antiseptic, and Scope mouthwash to determine which is the best in the elimination of mouth bacteria. Three people were used to test each mouthwash. As a control, a sterile cotton applicator was used to swab the mouth and collect a saliva sample. This sample was applied to a 1/4 section of a blood agar plate, and when cultured, would show the amount of bacteria in the mouth before using the mouthwash. The mouth was swabbed one minute after a thirty second rinse, and the saliva was again applied to another section of the agar plate. This would show the eliminating qualities of the mouthwash. Fifteen minutes and again one hour after the rinse, the mouth was again swabbed and the same procedure was followed. These samples would test the long-term effects of each mouthwash. The single plate with the four saliva samples were then cultured, either in an incubator or at room temperatures. The results of the bacterial growth were the basis of my experiment. Each mouthwash was tested three times and all information was graphed. I found that Scope was the best of the three overall, but for the most part I found that mouthwashes do very little to stop, inhibit, or kill bacterial growth in the mouth.

ELECTROSTATIC PRECIPITATORS
Ed L. Hamilton Jr. 2178 Road M, Pandora, Ohio 45877

2:30

My research project is on electrostatic precipitators and what I will attempt to do is to display and explain information on electrostatic precipitators, how they can be beneficial and some of their faults. I will have pictures of an electrostatic precipitator that I built and explain steps that I went through to come up with the results I came up with. Also I will have posters to accompany my pictures plus a report. In my experiments I used T.V. tubes to produce 15,000 volts D.C. current to power my precipitator. I also built a fire box and a chimney for it. I will also display commercial information I received through research and will display it on my posters.

CYTOCHEMICAL LOCALIZATION OF INSULIN-LIKE IMMUNOREACTIVITY IN THE MOUSE PITUITARY GLAND. Pansky, B., James S. Hatfield, Hardress J. Waller and G. Colin Budd, Departments of Anatomy, Neurosciences and Physiology, Medical College of Ohio, Caller Service No. 10008, Toledo, Ohio 43699.

2:30

Insulin-like immunoreactivity was localized in pituitary gland cells of the mouse with a horseradish peroxidase-labeled double antibody technique. Frozen sections and sections of Epon-embedded pituitary were reacted with guinea pig antiserum to porcine insulin, followed by peroxidase-conjugated rabbit anti-guinea pig IgG. Controls included absorption of the primary antibody with insulin, removal of insulin antibodies by affinity chromatography and omission of the first or second antisera. Immunoreactivity in pancreas sections containing islets of Langerhans was compared with that in the pituitary tissue. Immunoreactive cells with prominent cytoplasmic extensions toward the capillaries were present throughout the anterior pituitary tissue. These cells contained intensely reactive small secretory granules in the peripheral cytoplasm. Other types of immunoreactive cells were present in the infundibular stalk, along the intermediate cleft and adjacent to the third ventricle. These observations suggest that a possible role for insulin or an insulin-like peptide in pituitary gland function should be investigated.
Supported in part by N.I.H. Biomedical Research Support Grant S07-RR-05700-08.

SECONDARY & TERTIARY WASTEWATER TREATMENT

Timothy J. Krasen
8081 Wright Road
Broadview Hts., Ohio 44147

2:30

A continuous wastewater treatment study using an Activated Sludge followed by an Activated Carbon Adsorption was performed. Bench scale treatment units were fabricated for this study. A simulated wastewater was prepared using cat food to 0.066% by weight in water.

This study was run for four months in 1979. During that time four treatment evaluations were conducted at different wastewater flow rates. Performance of the treatment processes were monitored using a modified Bioassy test, Permanganate COD test and other observations. Calculations and control charts were prepared.

Waste reductions ranged from 92.7% to 94.5% for the Activated Sludge and 39.9% to 56.9% for the Activated Carbon Adsorption. Fish of the Cyrinidae family used in the Bioassy test survived the entire period of the evaluations.

Chanel High School, 480 Northfield Rd.
Bedford, Ohio 44146
Mr. Regis D. Scafe, Biology Teacher Mr. Bruce Domski, Principal

THE EFFECT OF ZINC ON THE GROWTH OF CORN PLANTS

Peggy Goodell R.R.#3 Bryan, Oh 43506

2:30

The growth of corn plants was stunted by high combined zinc and copper concentrations in the soil as observed by Aaron Madry of the Ohio EPA. The purpose of my study was to determine whether it was the copper or the zinc that was responsible for the damage to the corn plants in Madry's experiments. I grew five plants in each of eight containers. Each container had two and one half kilograms of soil and a proportioned amount of fertilizer. I added various levels of zinc to seven of the containers from one-hundred twenty parts per million to one hundred twenty eight thousand parts per million. I left the eighth box alone (with no added zinc) to use as a control. I received my data by measuring plant height and obvious plant deterioration. Up to fifteen thousand parts per million of zinc the corn plants actually benefited from the added zinc. Madrys experiments encountered drastic plant deterioration with much lower levels of zinc and copper concentration than I encountered. Since my zinc levels far exceeded Madry's with no deterioration, I feel I can safely conclude that the damage found in Madry's experiments was clearly due to the copper in the soil not the zinc.